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ORIGINAL ARTICLES.

A UNIVERSAL MENTO-DENTAL SPLINT, WITH REPORT OF CASE.

Read in the Section of Dental and Oral Surgery, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY M. H. FLETCHER, M.D., D.D.S.,

OF CINCINNATI, O.

Before showing the splint and reporting the case in question, it may be well to review in some degree splints and bandages for broken lower jaws, and in particular mento-dental splints.

Heath divides appliances for the jaw into two classes, external and internal to the mouth, though he says "it may be necessary to combine the two methods in a few cases."

The simplest and most effective form of external apparatus, and by far the best in a very large majority of cases, is the four-tailed bandage, two of the tails being carried over and tied on top of the head, the other two carried back and tied around the nape of the neck, the part covering the chin oft-times

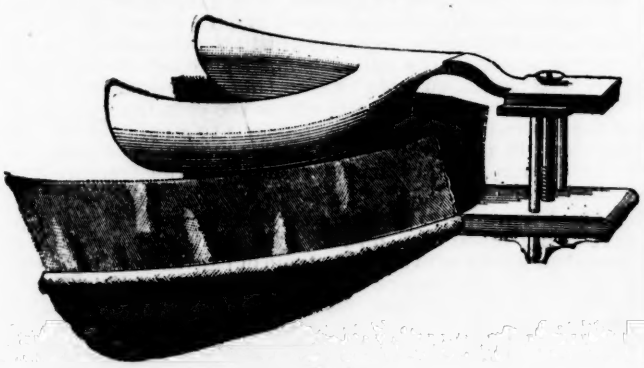

Fig. 1.

being reinforced by pasteboard or sheets of gutta-percha. This method with its variations is no doubt familiar to you all, and when the fracture is simple with no displacement is undoubtedly the best, since it brings the lower teeth in perfect occlusion with their antagonists and holds them in their proper places, as well as puts the fractured ends of the bone in direct apposition, so that when the fracture is healed the jaw is in every way in its proper and normal condition, both for use and appearance. The great objection to this form of apparatus, also in inter dental splints, is that the patient must be fed on liquid foods. Gross says, "I have known great emaciation to arise from inability of the patient to take appropriate nourishment during the long confinement of the parts." All inter-dental splints, also wires and ligatures, are usually accompanied by external bandages to hold the lower jaw against the splint and against the upper teeth, so that the inability to take proper nourishment enters largely into the objection to these forms. Dr. E. H. Angle's method is a most excellent one. It consists of buttons or short pipes soldered to bands which are fitted to the appropriate teeth and these bands are tied, wired, or fastened together with rods thrust through the short pipes on the bands and held at one end with a hook on the rod and a nut screwed on to the other end.

This method has the very great objection of complication, for one is certainly safe in saying that hardly any surgeon and very few dentists are prepared to or can fit a band to a tooth firmly enough to withstand much strain, even after long experience. The writer has used Angle's apparatus in a number of cases of regulating, and to fit them firmly to the

Fig. 2.

teeth in the case of a fractured and inflamed jaw would certainly be difficult.

Mento-dental splints or appliances made to grasp the lower jaw, are not new. They are made with one part fitting the crowns of the teeth, the other part the chin and lower border of the jaw.

In 1799 Rutenich, a German surgeon, used such an appliance. Bush in 1822, Houzelot in 1826, Lonsdale in 1867, Hill in 1866, and Moon at a later date. These all used mento-dental splints and all with reasonably good results. These splints have the great advantage of allowing the patient to take nourishment of any kind demanded. They also have the disadvantage of becoming foul after being worn awhile.

Heath remarks: "The great difficulty in using all forms of rigid splints to the jaw is the tendency of the support for the chin to produce abscess and

ulceration by the pressure upon the sharp border of the bone." These splints do not seem practicable used back of the second molar, but certainly work well with fractures anterior to that point.

Our own experience coincides with what Heath says, for in the case to be reported abscesses made their appearance and the splint was obliged to be removed much earlier than desired on that account. The case resulted reasonably well however, as the model will show, but we have a form of a chin support to present which is designed to do away with the objection spoken of, by using a canvas instead

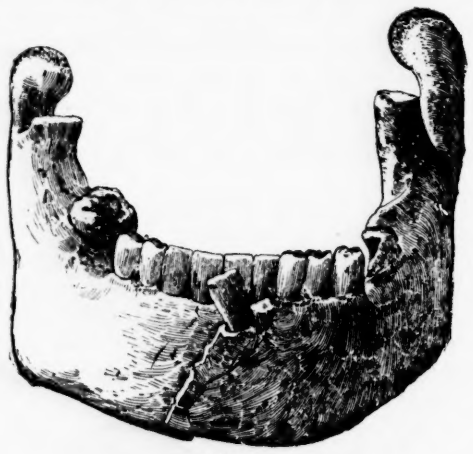

Fig. 3.

of a metal support for the chin. (See Figs. 1 and 2.)

The case we have to report is as follows:

Mr. B. H., age 36, on the 23d of last December was attacked by three highwaymen for purposes of robbery, but being a good fighter he laid out the three robbers and proceeded to his home. After having somewhat subsided from the excitement of the melee he felt a pain in the lower jaw. The next morning he proceeded to a surgeon and found that his jaw was fractured, one of the men having struck him a heavy blow on the chin with his fist. There being no displacement the jaw was dressed in the usual way with a four-tailed bandage and in three weeks he was back to his work again. Mr. H. is a wood-worker in a carriage factory.

On the the 18th of January, twenty-six days after the first accident and three days after he had gone to work, Mr. H. with five other workmen was called to test a

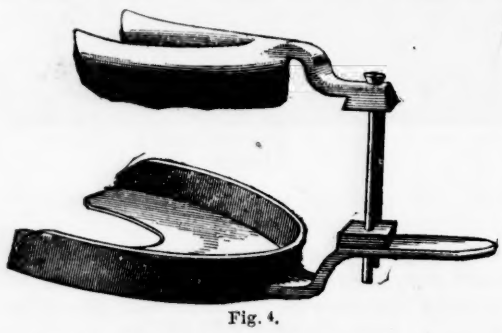

Fig. 4.

new fire ladder, and being the first to mount he was at the top, about thirty feet from the ground, when the ladder broke, and falling, he struck the pavement with terrific force, breaking both arms below the elbow and crushing the jaw in a frightful manner, breaking it through the old fracture. The nearest surgeon was called, who dressed the wounds and sent the men to their respective homes. Mr. H.'s jaw was dressed in the usual manner with a four-tailed bandage. Ten days after, finding the jaw was not doing well and that the fracture had not been reduced, the writer was sent for by the attending surgeons to see what could be done with some different kind of apparatus. After examination it was found that the jaws were so closely set together that it seemed impracticable to take an impression for the purpose of making a plaster model with the idea of breaking and resetting it in normal position for the purpose of making an inter-dental splint, as suggested by Heath and others. So we conceived the idea of making a mento-dental splint of two block-tin impression trays such as every dentist has at hand. This splint was worn for five weeks but had to be removed on account of two abscesses forming, one on either side of the chin, where the chin support pressed hardest on the soft tissues. The fracture was comminuted and compounded on the inside under the left bicuspids, the point of the right half and some of the bone being through the flesh at that place. The left lateral and the right alveolar process, which had surrounded it, was taken away with the fingers from the front side, and afterwards some smaller pieces of bone were removed from the wound in the same

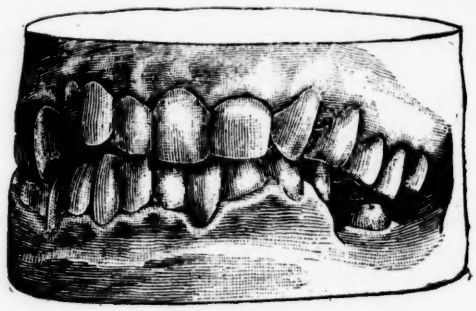

Fig. 5.

place. There was about one quarter of an inch of the bone lost and the left central now stands adjoining the left cuspid. (See Fig. 3.) The remaining incisors were all loose.

Twelve days after the accident, the splint being ready, such plastic adhesions as had formed were broken up, the left lateral and loose pieces of bone removed as stated, the two halves of the bone were reduced and ligated as nearly to their normal position as possible, and while being held firmly in this position by an assistant the impression tray used on top of the lower teeth was filled with plaster of Paris, which had been mixed with a one grain to the ounce solution of bichloride of mercury (for antiseptic purposes), the splint (see Fig. 4) was applied and the parts held firmly in this position with the hands until the plaster had time to set, the screw of the splint being tightened at the same time, and tightened from time to time as necessary.

The fracture was obliquely across the chin from the neck of the left cuspid across the symphysis to a point below the right cuspid, as shown in the plaster model. The result is to be seen in another model made after the fracture had healed. (See Fig. 5.)

[Fig. 1 represents the ideal universal splint, the chin-support being made of a fork of stiff wire, across which is stretched heavy canvas, the margin of canvas being allowed to stand up long enough to pin or sew the head and neck bandages to, thereby gaining the advantage of a four-tailed bandage in addition to the mento-dental feature of the splint. In the early stages of the case the tails can be kept tied, excepting at the times of feeding, or left off altogether, as the case may require. Additional trays of different sizes may be made to suit the case; they are inserted into the splint by removing the screw, and withdrawing from the slot the one in place and inserting the one desired. The size and shape are further modified by bending the cup (which is made of block tin) to any shape desired. The part of the splint coming down and fitting on the crowns of the lower teeth is designed to be filled (when applied) with plaster of Paris, softened gutta-percha, or other material suitable for holding the teeth firmly in position. This splint is designed to be made and kept on sale with other surgical supplies, one outfit being sufficient for all cases where it may in any way be demanded.

Fig. 2 represents the splint in position. The splint represented in Fig. 1 would not need the cotton packing, and can have the four tails attached or detached at pleasure.

Fig. 3 represents a plaster model of the jaw-bone, as near like the jaw when found as could be constructed; the projecting left lateral incisor and the amount of bone, as represented by the line, were lost.

Fig. 4 represents the splint used in the case, which is constructed out of the ordinary block-tin impression trays, the fittings being made of brass plates and wire soldered together with soft solder; the screw is an ordinary stove or carriage bolt, made to cut its own thread in the soft solder

which has run in the hole in the lower part of the apparatus, and is to be tightened or loosened with an ordinary screw-driver. The chin-support was packed with cotton wool.

Fig. 5 represents the case after recovery.]

June 1, 1892.

Discussion.

Dr. John S. Marshall said he was interested in the splint, and that while it served its purpose admirably, he thought the better way to treat fractures of the inferior maxilla was to wire the parts firmly together with a silver wire, as the mouth is so much easier to keep clean than when a splint is worn. In such cases he dissects down the tissues till the edges of the bone are reached, the tissues and the periosteum being laid back. A drill is then passed through near the end of the bone, care being taken to avoid the roots of the teeth and the inferior dental canal. A silver wire is then passed through the holes in the ends of the bone, and the parts brought together. Two or more such sutures are made, and secured until the fractured parts are immovable. He has treated many such cases in this way without any bandages. No after-treatment is required except frequent washings with an antiseptic mouth-wash, for which he prefers Thiersch's solution, as follows:

Boracic acid, 12 parts;
Salicylic acid, 4 parts;
Water, 1000 parts.

This is a good antiseptic: is not dangerous, nor unpleasant to the taste, only a little bitter.

He related the cases reported on pages 575-6 of the *Dental Cosmos* for 1892, and in reply to a question said it was usually necessary to leave the wires in place from four to eight weeks, the time depending upon circumstances. In nearly all cases suppuration will take place and retard the knitting of the bone.

Dr. Curtis said the results of the case reported by Dr. Fletcher are exceptionally good, and the splint is very well adapted to the class of injuries it was designed for. He thought in hospital cases the plaster bandage was perhaps as good as anything,—that is, where there are teeth in both sets; but before it was applied several layers of cotton should be placed under the chin whenever the bandage will come in contact, to lessen the liability of abscesses forming.

Dr. Marshall said that the evidence of all surgeons to whom he had talked upon the subject was that a splint of this character was always a failure where there was any displacement, and that the system of wiring was always used.

Dr. Allport said that he agreed with Dr. Marshall that wiring was better than any splint. He believed that he himself was the first man who used wire for this purpose. It was about thirty years ago, and he got good results. He related the case of a lady who fell from a step and broke each jaw in four pieces. He wired all the pieces in place, and the bones united perfectly, and the result was in every way satisfactory. He thought that oral surgeons were better able to handle such cases than the general surgeon.

Dr. Barrett reported a case of a boy who was run over by a heavy wagon in such a way as to crumble the lower jaw frightfully. He was brought to the city and put in the hands of a competent and skillful surgeon, who wired the pieces together by wire around the teeth, When the mouth was open the parts were kept in proper position, but when shut the jaw went away around to one side. Dr. Barrett, being called in consultation, found four physicians there, all of whom confessed that the injury was beyond their skill to repair, hence they had called him in as a specialist in these things. The boy had been under an anesthetic for most of the time for four hours.

Reasoning by exclusion, as there was no crepitation and no fixation, he concluded that there was no luxation, and no complete fractures that were not securely wired, and that there was only one possible cause for the condition: an incomplete or "green stick" fracture across the angle of the ramus. With the muscles relaxed the jaws fell directly down, but when the boy attempted to close his mouth the temporal and internal pterygoid, with some of the fibres of the masseter, not being counteracted on the other side, drew the jaw to one side, it bending or yielding at the point of the incomplete fracture.

The boy was taken to Dr. Barrett's office, and gutta-percha impressions taken of both jaws. The impressions were trimmed to the proper shape, and a notch cut in front for feeding through, and the boy having been again anesthetized, the occluding surfaces of the gutta-percha impressions that were to serve as splints were warmed until they were adhesive, and placed upon the teeth; then by main force the jaw was carried to its proper place, the two gutta-percha splints stuck together, and the whole was fastened with a two-tailed bandage. The operation was a perfect success.

Dr. Fletcher said that though wiring was undoubtedly to be preferred in many cases, it was not admissable in such as he described, because in his case at least a quarter of an inch of the bone was lost by comminution, and to wire the bone together would make proper occlusion of the teeth impossible.

DISEASES OF THE GUMS.

Read in the Section of Oral and Dental Surgery, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY JOHN L. GISH, M.D., D.D.S.,
OF JACKSON, MICH.

It is not my purpose to try and cover the whole field of pathological conditions that would naturally come under the above heading, but simply take up such parts as are more common in our general work.

So far as the anatomy, histology and normal conditions of the gums are concerned, I will pass over that division, and not consume time by repeating that which we must know, in order to fully appreciate any abnormal conditions or changes that may take place in the gums.

When you deal with pathological conditions, let them exist wherever they may, in our body, we at once encounter the problems of growth and development, nutrition and assimilation. So here, when we find diseased conditions of the gums, we know that the laws that govern the process of growth and development, and the functions of nutrition and assimilation, have been changed to a greater or less extent, with the corresponding resultant of active or passive congestion, hypertrophied or atrophied conditions or increased cell growth of the tissues involved.

When we take up active or passive congestions or the acute and chronic inflammations of the gums we consider the type of cases that come to our notice more often, and cause more trouble to our patients, than is made manifest by the hypertrophied, atrophied and cell growth conditions combined. Under the section of acute inflammation of the gums, we have to contend with the acute or inflammatory œdema, marked by its rapidity of development, severe pain, tumefaction and great tension of the tissues, due to some chemical or traumatic lesion, and closely connected to this pathological condition, we do encounter gangrene of the mouth (or noma), which is less rapid in its development and attended with a less degree of pain, but far more destructive in its results, and much more obstinate in yielding to treatment. Under this division we may also include the acute catarrhal, herpetic and croupous inflammations.

Under division second, or passive congestions where the circulation is slowed in its course, affording an opportunity for the red blood corpuscles to accumulate in the arteries, and the white blood corpuscles to find their way into the veins, whose anatomical structure, viz.: their thin walls, affords an easy escape of the white blood corpuscles, by their amœboid movements, into the surrounding structures, and at the same time with the passage of the white blood corpuscles, or leucocytes, there is also

the transudation of the liquor sanguinis, forming the serous effusion, which together with the leucocytes, dividing and multiplying, excite the tissues into cell-proliferation. This in turn causes a greater nutritive activity with the formation of a cell growth, which is very unstable in its composition and soon passes into retrogression, or the breaking down stage, with the formation of pus, which dissolves alike the alveolar process, the dental organs and the soft structure, thus completely destroying the involved tissues and ending a cycle of changes, only again to be renewed, and cause further destruction of the parts by continuity and contiguity, as is done in chronic catarrhal inflammations, phlegmonous and suppurative inflammations or abscesses, and fistulæ of the gums.

Under division three we will include hypertrophied and atrophied conditions, and under division four such cell growths as the fibrous, papillary, and vascular tumors and epitheliomata of the gums.

Division four including as it does, the variety of cases that come to our notice the least, have pathological conditions in common, varying only in the elements involved, and I cannot do as well in giving their pathology, as I can to repeat the words of Wedl, who regards papillomata of the gums as essentially localized hypertrophies of the papillary portion; generally associated with caries and located upon the facial surface of the gum; their diminutive conical elevations form dome-shaped enlargements and present an analogy with acuminate condylomata.

Fibromata of the gum occur in the submucous connective tissue in the form of projecting, superficially smooth, compact tubercles, which slope away towards the surrounding tissues; they are by no means of rare occurrence, especially those of smaller dimensions, and are composed of firm bundles of connective tissue with numerous interlacements, and imbedded cells. Linhart extirpated a fibroma of the submucous connective tissue nearly as large as a hen's egg.

Angiomata (vascular tumors) are of rare occurrence, and some give rise to hæmorrhage which endangers life. Salter reported a new-formation of this kind which was composed of numerous convoluted blood-vessels and connective tissue. The surface of the tumor, which was lobulated, located upon the neck of a tooth and as large as the berry of the common winter cherry, was covered with papillæ like those of the gum and with epithelium. The latter condition serves to indicate that the new-formation was seated in the submucous connective tissue of the gum and not, as alleged, in the dental periosteum.

Epithelial cancer sometimes occurs primarily in the gum and knotty elevations are developed, which increase in number and extent and spread to the submucous connective tissue, dental periosteum, alveolus and alveolar process. The epithelium undergoes notable proliferation and imparts a brighter color to the knots; it also dips down to a considerable depth into the substance, where the familiar rosette-shaped, nest-like groups of flattened, often distinctly ribbed cells are met with. Sometimes the papillæ of the gum also grow considerably in length and breadth, and the cancer acquires the appearance of a succulent wart which finally ulcerates. Schuh observed the origin of the epithelial cancer upon the buccal surface, usually in the vicinity of the last molars. Here also, he says, it maintains for a time the character of the broad cancer; that is, of a form of cancer which increases only in its extent of surface, not in depth, remains superficial, therefore, resembling a granulating surface, and slowly destroys the organic parts.

The hypertrophied and atrophied conditions, or division three of this paper, are more often met with than the conditions under division four, and of the two types of conditions under division three, the hypertrophied is far more common.

Atrophy, as the name implies, is a progressive and morbid diminution of the bulk of tissues of which the gum is composed. Atrophy is generally symptomatic, but it may be due to a local cause. Now inasmuch as atrophy from a pathological standpoint is just the reverse of hypertrophy, it will not be necessary to review its general pathology in order to state the changes that take place, but the general pathology of hypertrophy of the gums as given by Wedl, will serve the double purpose; hence, hypertrophy of the gums occurs frequently among the sequelæ of a chronic inflammatory condition of the root membrane following caries of the teeth, and is induced, also, by the irritation of the gums produced by the products of the degeneration of the hard tissues of the teeth.

The sharp edges of the stumps, too, which remain after the destruction of the coronal portions and necks of the teeth, become the sources of irritations.

The hypertrophy occurs both in the papillary portion and, beneath the latter, in the corium of the mucous membrane. When it occurs in the former, it is most conspicious upon the facial surface of the gums and is confined to the region of one tooth or a few teeth, or acquires more extended limits in cases of caries involving the crowns or roots of several teeth.

The epithelium, also, participates in the hypertrophy which affects the papillary portion.

The secretion of mucous usually is increased in connection with papillary hypertrophy, and partial exfoliations of the epithelium occur, leaving superficial erosions. Bleeding readily occurs from the painless swellings, even from slight mechanical irritations. Sometimes the papillary portion is not involved and the proliferation is confined to the corium, occasioning a swelling of the gum, which has a smooth exterior. In these cases, which are more protracted, the cellular infiltrations rise to a tendinous connective tissue; in other words, the hypertrophic gum becomes sclerosed, and, consequently, it presents an increased power of resistance and a diminished succulency. The gradually obliterated papillary portion is covered by a common, thick, superficially smooth layer of epithelium. Notwithstanding the increased consistence of the corium, cellular-infiltrates are met with in the form of long chain-like rows or clusters, of ovoid cells, which are enclosed with a capsule of fibrous tissue. Since the periosteum, also, beneath the indurated gum is thickened, it is by no means strange that cross sections of the latter sometimes present slender trabeculae in the process of growth, together with young bone-corpuscles," while the above has given us the general pathology of hypertrophic conditions of the gums, there is yet another subdivision of this type of cases, that does come to our notice quite frequently and I mean the hypertrophied conditions of the tissues that often times surrounds, or accom-

panies the eruptions of the wisdom tooth. It is true that in this particular type of cases, we have a greater degree of pain, more swelling, and inflammatory action extending to the surrounding tissues, than is the case in true hypertrophy of the gums, but the difference in the exciting cause, will explain the difference in symtomatic results.

In true hypertrophy, usually the result of some chronic inflammation of a root membrane, or the irritation of the gums produced by the products of the degeneration of the hard tissues of the teeth, we have the train of symptoms or conditions as above given; but in this particular type of cases caused by undue pressure on the surrounding tissues, and still further augmented by the close relations of the parts, and the mechanical action of mastication we account for the difference in subjective symptoms.

In chronic catarrhal inflammation, included under division second, or passive congestions we find the mucous membrane thickened and of a rose color with white spots which appear and disappear with the exfoliation of the epithelium. The patient complains of unpleasant sensations such as burning, itching and tickling, and as a result of this congestion there is a grey mucilaginous, and at times a puriform secretion poured out upon the surface of the gums. Of course the degree of this inflammation is modified to a greater or less extent, according to the time that the lesion is allowed to run, and as to whether the patient is suffering from other systemic troubles, or from catarrhal inflammations of surrounding membranes.

Phelgmonous inflammation, is somewhat sudden in its onset,but is attended with but little or no fever. The congestion is confined to both the corium and submucous connective tissue, with ulcerations occuring in small, shallow, yellowish spots or in the form of one large phagedenic ulcer. If this ulceration is allowed to continue, we will have necrosis of the osseous substance, beneath. Recovery is very slow and the surrounding membrane is spongy, from infiltration of the liquor sanguinis, very sensitive and bleeds easily. This type of cases is common, and is found in the well nourished, as well as in those who have systemic complications.

Suppurative inflammation, is where the lesion has been such, as to cause the passive congestion to result in the formation of pus, this pus may find its way to an external opening, or it may undergo, resorption. If the exciting cause has been mechanical such as compression, contusion,or laceration, the recovery is speedy with suppuration, but if on the other hand the exciting cause is a deceased root membrane of a chronic character, and the irritant becomes extended to the gum a fistula is formed, which will continue to discharge its secretion, until the parts are made healthy within.

Again referring to division one, under which we consider inflammatory œdema, acute catarrhal, herpetic and croupous inflammations, there is in common the rapidity of onset, severe pain, tumefaction and sponginess of gums, attended with the unpleasant sensation of itching and burning, in addition to this, the herpetic inflammation is characterized by the formation of vesicles, which rupture and remain a superficial erosion healing without cicatrization; closely allied to the herpetic condition is the inflammatory affection of the gums, developed during the course of an acute exanthemata, such as scarlet fever, measles etc.

The croupous inflammation, not only has the subjective symptoms that attend all active congestions, but it is characterized by the greyish structureless membraniform exudation, which may be very easily detached. This exudation takes place very rapidly and as rapidly undergoes degeneration with the production of an offensive, sanious mass, which dips down between the gum and the tooth thus exciting the root membrane into an active congestion with the corresponding loosening of the tooth. If the action is not checked the alveolar process is destroyed, and the teeth are lost.

In considering the treatment of the above pathological conditions, it must be governed according to the nature and type of the case in hand. But to generalize, I will say that in treating division first, or active congestions, with the exception of those cases due to acute examthemata, I have found in galvanic and faradic electricity my most valuable agent, and it is so valuable, from the fact that by the proper manipulation of this subtle agent, we can correct circulatory disturbances, promote absorption of the transudated fluids, and cause the secretions and excretions to be changed into their normal condition.

Take for instance a case of noma, destructive in its results, and obstinate to cure, here by an application of electro-chemical cauterization from the positive pole, we can arrest the superficial destruction of tissue, and produce a healthy restoration of the parts beneath.

In treating the passive congestions I can apply electricity with benefit, only to the chronic catarrhal inflammations, the other types of cases of the second division are treated according to the principles of good surgery.

In dealing with hypertrophies, fibrous tumors and epitheliomata the electro cautery has been my best and most successful remedy. In order to cope with the papillary and vascular tumors, the galvanic current has been my most potent agent.

THE CONDITION OF THE DENTINE IN PULPLESS TEETH.

Read in the Section of Oral and Dental Surgery, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

BY W. C. BARRETT, M.D., D.D.S.,
OF BUFFALO, N. Y.

I had promised the Secretary of this Section that I would prepare and read a paper at this meeting upon the "Condition of the Dentine in Pulpless Teeth." It was a subject upon which I had bestowed some thought, but with the literature of which I had not made myself thoroughly acquainted. I had read Prof. Miller's work on "The Microörganisms of the Human Mouth," and his communications to the various journals, notably *The Dental Cosmos*, but not with this special subject in mind. I had not collocated his writings on this theme, and hence had not collated them. When this had been done, I was astonished at the thorough manner in which the ground had been covered. Had I examined my subject earlier, I should not have attempted an excursion in the field, but having engaged to present this paper, I will endeavor to redeem my promise, premising that I can do little save to call attention to the great work done by Prof. Miller in this direction, a work

which does not seem to be fully appreciated, and which perhaps will not be until each attempts, like me, specially to study it for himself.

In view of his exhaustive experiments, one can but wonder at the seemingly crude theories now held and taught by some men to whom we naturally turn for illumination. Perhaps I shall do more good by placing Dr. Miller's comprehensive studies before you for discussion than I would by effort in any other direction, for it must be remembered that his are not mere generalizations, such as mine must necessarily be ; they are the result of long series of conclusive, scientifically conducted, original experiments and observations, and they are not to be overthrown by any inductive reasoning whatever. In view of the overwhelming original testimony which he introduces, no man has the right to dispute his deductions until he is fortified by a like mass of opposing facts, deduced from like carefully conducted experiments; or until he can indisputably demonstrate that the conclusions reached by Dr. Miller are not warranted by the results obtained.

The dentine, deriving its nutriment from the pulp of the tooth through the dentinal fibrillæ, is separated from all the other tissues of the body, through investment by the cementum and the enamel. The latter tissue is not only practically devoid of living matter, but it is not in direct relation with any tissues save the dentine itself. For our present purposes then, the enamel may be looked upon as a simple protecting cap, whose office it is to preserve the dentine and pulp from injury.

The cementum is of a different character. It is but slightly differentiated from true bone. It is in relation with a periosteal membrane, and it is nourished like bone through a system of lacunal corpuscles, connected by canaliculi.

In young teeth it is not infrequently the case that there is even a kind of system of Haversian canals, traversing the cementum and dentine between the pericementum and pulp, whose office it is to assist in maintaining the vascular supply, and incidentally, perhaps, to afford nutriment to the deeper cementum corpuscles.

The dentine is yet more differentiated, and in its structure has lost the lacunal corpuscles, while the canaliculi are modified into the dental fibrillæ. Their office is not materially changed, nor are we to suppose that the contents of the dental tubuli differ very widely from the canaliculi of true bone. They form the living portion of the dentine, as the lacunal corpuscles and the canaliculi form that of true bone. The dentinal fibrillæ are in connection with the vascular pulp, and from it derive the nutriment necessary to their continued life. The corpuscles found in true bone and in cementum are absent, and hence there is little that bears a resemblance to that concentric texture of true bone which forms its lamellated structure. At the extremities of the dentinal fibrillæ, we have the irregular inter-tissual spaces which mark the boundary line between dentine and cementum, and which may perhaps be considered as modifications of the cementum corpuscles, but they are not intimately connected with the dentinal structures.

The dentinal fibrillæ, depending as they do on the vascular pulp for nutrition, certainly lose their protoplasmic vitality when separated from it. Let us consider for a moment the condition of the dentine in a tooth the pulp of which has, without medication, just been removed. The fibrillæ have been freshly torn from their relations with the pulp, and remain filling the dental tubuli as before their violent separation. Like all protoplasmic material, they are composed of the great quaternary of elements which enter into the composition of all organic elementary structures.

But the dentinal fibrillæ probably also contain other elements, such as sulphur and phosphorus, which make it more near the nature of albumen. Indeed, it is probable that if we consider it as clearly albuminous, we shall not do much violence to nature. Carpenter says that this substance is the proper pabulum of the animal tissues generally, and so the dental fibrillæ, possibly modified somewhat, may be looked upon as albuminous in their nature.

The dentinal tubules which contain the fibrillæ are exceedingly minute. For the putrefaction of the contents of the tubuli it would be essential that putrefactive organisms should enter them. While it is quite possible that these may penetrate tne tubuli, it must be to but a limited extent. In an article in the *Dental Cosmos* for May, 1890, upon "The Decomposition of the Contents of the Dental Tubuli," Dr. Miller shows that from their minute size and the very small amount of nutriment for the microörganisms which they contain, any bacteria which enter them must soon perish from want of pabulum, to say nothing of the fact that they are mostly ærobic, and so could not possibly live in the tubuli for any length of time.

But not satisfied with *a priori* reasoning, he commences a rather remarkable series of experiments and observations, from which he incontestably deduces the conclusion that bacteria do not penetrate the tubuli of undecayed dentine to any marked extent; certainly not enough to cause any necessity for the disinfection of the dentinal substance in teeth in which there has been no decay within the pulp canals.

I need not enlarge upon this. The record is open to the inspection of all, and no one has yet dared to take issue with Dr. Miller upon this point. It must be accepted that in the dentine of the roots of the teeth in which decay has made no progress, there is no infection of dentine that demands any antiseptic treatment aside from that usual in pulp canals.

What then becomes of the contents of the dentinal tubuli? It is but necessary to consider their character to form a clear estimate of this. The dentinal fibers cannot be considered as pure albumen, for that is only found in connection with other substances in the body. But whatever its exact composition it presents certain characteristics, one of which is its tendency, when at rest and separated from living tissue, to dissociate the watery portion, and to form a dried residuum which is insoluble. This condition may also be produced by most acids, by the metallic salts and by creosote.

The natural tendency then, for an albuminoid fibril, would be to assume a mummified condition, most conducive to its indefinite preservation, when kept in the state in which it will be found in the dentine of a tooth root.

Fibrine is but comparatively slightly differentiated from albumen. It contains the same elements, but it offers certain physical characteristics that distinguish it. Albumen is coagulated by heat, and by certain agents. Fibrine coagulates spontaneously

when exposed to the air. If then the fibrillæ of the dentine approach fibrine in their characteristics, they will undergo the change called coagulation without the intervention of any medicinal agent whatever. It is in this condition that, if sealed up from external influences, they present the very best state for the preservation of the tissue in which they are found. Hence the condition of the dentine is best in which the contents of the tubuli have been coagulated, or separated from the watery elements, and permitted to become a kind of minute mummy within their investing sheaths.

But the investigations of Miller, to which I have already referred, determine another matter. He did not find that the mouths of the dental tubuli, in teeth from which the pulp had been removed, were opened toward the pulp chamber.

He had under examination nineteen teeth. In ten of the roots of them he found the canals to be completely or partially lined with a homogeneous structure, containing few or no tubuli, but occasionally a formation resembling a bone lacuna, and bearing a much more near resemblance to cementum than to dentine. This layer is impenetrable to microörganisms, and therefore forms a protection to that tissue when the pulp has been removed. We find then, that the dentine is not only protected by the cementum on its external aspect, but very often by a modification of this tissue on its inner surface.

There is, therefore, little danger of infection of the contents of the dental tubuli. But even if this were possible, I cannot conceive that it would matter much. The amount of infectious matter would be so small, and the chance for the penetration of the gaseous products of decomposition through the dentinal tubuli, past the zone of demarcation between dentine and cementum, and finally through the cementum corpuscles and canaliculi which are themselves filled with living matter, would be so remote, and its influence upon the pericementum so infinitesimally small, that it seems folly to take it into consideration in the presence of so much more potent factors.

Clinical experience too, as is so plainly stated by Dr. Miller in the article to which reference has been made, does not sustain the theories of those who insist upon the possibility of infection from dentine. If the contents of the pulp canal be completely removed, the territory made thoroughly aseptic and the space finally filled, there is, so far as I am aware, no record of any trouble from the dentine. Even admitting that there exists within the dental tubuli matter which is susceptible to putrefactive changes, it is too small in amount to induce any disturbing conditions in the presence of a pulp canal carefully filled with a material which must seal the exceedingly minute mouths of the tubules wherever they are not already stopped by the modified dentinal layer of which Miller speaks. In the presence of much more important things, it seems like bad judgment to elevate such a mole-hill into a mountain, for it has a tendency to carelessness in things that need more attention. I doubt whether there has ever been a case of re-infection of the tissues about a tooth that has had its root filled after antiseptic treatment, that cannot be directly traced to some imperfection in the manipulation, or to some infected pockets outside the tooth itself. It is well known that the usual place for the formation of an infected pocket is at or near the apex, and that there may be a penetration of the microörganisms and the formation of infected pockets for some distance back in the bone. I have myself seen at least three such, extending back from the point of an incisor tooth until the last one was over the second bicuspid, and each of these separate pockets connected with the original one at the apex of the incisor.

They were only reached by a long incision through the gum and external alveolus, extending from one to the other until the last one had been reached. If the infection had been from the dentine, it would have manifested itself quite differently.

Undoubtedly there are cases in which the infected spot is at some point in the pericementum between the gingival margin and the apex of the root. But this does not by any means prove that it came from infected dentine. Perhaps after the apical foramen, the most usual place for the formation of an abscess is at the bifurcation of the roots of a bicuspid or molar. I believe this to be due to the fact mentioned earlier in this paper, that something analogous to an Haversian canal there may penetrate the cementum and dentine, from the pericementum to the pulp. I have demonstrated such many times.

Not infrequently an abscess refuses to yield to the usual treatment through the pulp canal, and for the reason that the medicaments fail to reach the infected point. But such instances cannot be said to be produced by infected dentine.

There is, in truth, another foramen analogous to that at the apex, and it becomes septic in precisely the same manner as does the latter.

In what I have previously urged, we have presupposed that caries has not commenced within the pulp canal. And yet we are all well aware that in cases in which the pulp had been long dead, and there has been extensive decay of the coronal portion of the tooth, there was caries of the dentine commencing within the pulp chamber and extending down the canal.

In instances like this, of course there will be thorough infection of the dentine. It will not, however, be due to decomposition of the contents of the dental tubuli, but to infectious matter which may find its way into the hollow from external sources. It would be as manifestly improper to fill such a canal without removing the carious portion, as it would be to fill a cavity from the outside without careful excavation.

Here would be an instance in which the reaming out of the canal to the depth to which caries had penetrated would be eminently proper practice. It is very seldom that this decay will extend far down the root canal, or be very deep, without such destruction of the crown and cervical portions of the root as to make preservation practically impossible.

As regards the use of coagulating agents in the treatment of root canals, I cannot conceive of any objection to them. If by any it be thought necessary that dentine should be disinfected and made more aseptic, this can only be accomplished by agents which have the power of penetration in a marked degree. These are usually coagulants, like chloride of zinc, bichloride of mercury, etc. Upon this subject I can only refer to the experiments and observations reported by Dr. Miller, in an article on "The Relative Rapidity with which various Antiseptics Penetrate Pulp Tissue," published in the *Dental Cosmos* for May, 1891.

Discussion.

Dr. E. L. Clifford said the discoloration found in dead teeth was probably caused by the formation of sulphides of some of the different metallic agents used in medicaments. The less we treat the teeth in the vast majority of cases, the better will be the results. No law can be laid down to which exceptions could not be found, but in the majority of cases the quicker we fill a root-canal and the cavity over it, the more satisfactory the operation will be. Two things, however, work against immediate root-filling: first, the difficulty of drying the root; and second, soreness of the tissues about the root. If there is no way to dry it thoroughly, or if it is too sore to work on, then it is better to wait. In all favorable cases he advocated immediate filling.

Dr. W. W. Allport said the Section was under obligation to Dr. Barrett for a most excellent paper.

In our practice we have two classes of pulpless teeth to treat. Those we devitalize leaving the dentinal fibers in the condition when devitalization took place, are in the most favorable condition for successful treatment. The other class is where the nerve has been dead for a long time. Here the condition is different, and the treatment must be adapted to the altered condition.

Our aim should be to prevent discoloration of the dentine. Whether this can best be done by the use of oils or of chlorine, or by thoroughly drying the cavity and canal, so as to leave the fibers in a mummified condition that will prevent decomposition, is the question to decide. In old cases we should use every means in our power to restore the normal color, but in freshly devitalized teeth little or no treatment is necessary.

Dr. Gish said that whatever treatment was necessary could as well be done in one sitting as in twenty, and that the duty of the dentist to his patient calls for the course of treatment necessitating the least trouble and pain, therefore he advocated immediate filling.

Dr. M. H. Fletcher said that to him it seemed that the pulp-canal before filling must be surgically clean; that is, it should have all substances removed which might contain or support any spores or bacteria. In a case reported by Dr. H. A. Smith in a paper read before the Mississippi Valley Dental Society, trouble arose at the apex of a tooth that had been filled for fourteen or fifteen years. In the discussion it was said that there had been a continual effort at the apex of the root to dissolve the root as a foreign material. This will always happen if there should be an excess of filling-material forced through the end of the root, and if the tubuli had not been thoroughly disinfected the septic matter contained in them would set up suppuration.

In regard to the substance covering the tubules from the pulp-chamber, he had learned that after the tooth is fully formed there is a deposit, as it has been called, a translucent zone, lining the chamber and pulp-canal, but the deposit as he had seen it is penetrated by the tubuli. This must be so or the deposit could not take place, and he thought the tubuli were sufficiently numerous to need disinfection.

Dr. G. L. Curtis said the paper was an argument in favor of removing the pulp while it was healthy, and not destroying it by any substances that would enter the tubules. He could understand how in teeth so treated the deposit spoken of would occur, but in teeth dead for a long time it would not be there.

Dr. A. E. Baldwin did not agree with Dr. Barrett's idea that anything was so well proven that a dentist should finally accept it as a truth without satisfying himself by independent investigation. Because another had formed a theory and by experiment satisfied himself of the truth of it, was no reason anyone else should accept it. In regard to bacteria and microbes, and the necessity of making our root-canals aseptic, he disagreed with the paper. He did not think we could get them in better condition than by desiccation. He seldom uses anything in the way of antiseptics except carbolic acid in five per cent. solution, and has very good success. If he can get the root cleaned out, in an ordinary sense, whether it is, "surgically clean" or not, and get it thoroughly dry, he did not worry about the success of the filling. He thought a great deal of the irritation about the end of the root could be treated from the outside rather than through the root-canal.

Dr. Barrett said we would have to modify our view in regard to the pathology of alveolar abscess. He believed it to be thoroughly demonstrated that the pericementum furnishes all blood-supply to the growing tooth. He did not believe anybody ever saw arteries and veins passing through the apical foramen. He believed there is something like Haversian canals that pass through the dentine and the cementum to the pericementum, and that pus will often be found about diseased teeth at the bifurcation of the roots, and this shows why the treatment through the roots will not succeed. He believes that thorough drying will make a tooth aseptic, but sometimes the point of infection will be found away off from the tooth that seems to be the cause of suffering to the patient. In these cases, of course, the treatment must be on the outside, and followed up till the point of infection is discovered and broken up and cleaned out.

THE ETIOLOGY OF LARYNGISMUS STRIDULUS.

Read in the Section of Laryngology and Otology, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

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Scarcely any affection has excited so much speculation in regard to its cause as laryngismus stridulus. The first definite theory regarding its etiology was put forth by Kopp in 1830, who asserted that it was caused by the enlargement of the thymus gland.[1] In 1836 Ley maintained that it was always due to "paralysis of the abductor muscles arising from the pressure of strumous, bronchial or cervical glands on the recurrent or pneumogastric nerves."[2] Marshall Hall ascribed laryngismus to a reflex cause, believing that it resulted from irritation in some other part of the body;[3] and this theory was supported in 1849 by Reed, who observed that the spasm was frequently caused by retained meconium, fæcal masses and worms.[4]

These opinions, however, were not universally accepted, for it was generally believed, as Mackenzie observes, that the weight of evidence pointed to the practical acceptance of molecular changes in the nerve centres as the essential cause of the phenomenon.[5]

In view of the fact that it occurs most often in rachitic children, Elsässer[6] in 1843, and Lederer[7] in 1852, maintained that it was caused by craniotabes and softening of the occipital bones, and that the attacks were excited by the pressure to which the brain was subjected when the child lay on its back.

From recent observations made from a physiological and neurological standpoint, Hughlings Jackson (than whom there is none more competent to speak on this subject) asserts that the relation of rickets to attacks of laryngismus stridulus in children is due to the abnormally soft ribs, that render the action of the diaphragm insufficient (the infant's breathing being almost wholly abdominal), and thus, especially during sleep, when the attacks commonly occur, there is an overstimulation of the respiratory centres by supervenous blood, and an excess of the natural stimulant, which result in convulsions.[8] In a previous paper on this subject, Hughlings Jackson[9] was at a loss to explain how this spasmodic effect was brought about by overstimulation of the

1 "Denkwürdigkeiten in der ärztlichen Praxis," Frankfort, 1830.
2 "Essay on Laryngismus Stridulus," London, 1836.
3 "The Nervous System," 1841.
4 "On Infantile Laryngismus Stridulus," London, 1849, p. 71.
5 "Diseases of the Throat and Nose," London, 1880, vol. 1, p. 479.
6 Der Weiche Hinterkopf, Stuttgart, 1843, p. 161.
7 Beobachtungen über Spasmus Glottidis, Jour. für Kinderkrankheiten xviii, 1852.
8 "Neurological Fragments," British Med. Jour., 1892, vol. 1, p. 489.
9 "A Contribution to the Comparative Study of Convulsions," Brain, London, April, 1886.

brain centre; but since Seamon and Horsley[10] have found in their experiments that the adductors as well as the abductors of the vocal cords are controlled by nerves centering in the medulla, it is readily seen that stimulation of this centre may result in abductor disturbance. Hughlings Jackson also shows that similar results may be brought about by other methods, as for example in rabbits, by: 1. Cramping the trachea, thus producing insufficient oxygenation of the blood, and as a consequence, the overstimulating of the nerve centre; 2. By paralyzing with curare the motor nerves ending in the respiratory muscles, which results in convulsions of these muscles on account of the overstimulation of their nerve centres through the deficient aeration of the blood; 3. By dividing the phrenic nerve, thereby paralyzing the diaphragm (with which respiration in them is almost entirely carried on), which causes them to die of asphyxia, associated with convulsions; 4. By rapidly bleeding them to death through the opening of an artery, when convulsions are produced almost identical with those produced by compression of the trachea; 5. By tying the great arteries of the head, depriving the medulla of arterial blood and leaving the head surcharged with venous blood, when convulsions are produced.

In explaining this phenomenon Hughlings Jackson does not claim that laryngismus stridulus is an asphyxia fit. Were this the case, he says, "this condition would certainly end in death in every instance; for as Dr. Gray says, 'supervenosis initiates the spasm, which increases the supervenosity, and laryngismus would consist of a single, and necessarily fatal, gigantic respiratory spasm.'"[11] We know that in some instances the respiratory spasm ends fatally. That this does not more frequently occur is explained by the fact that when there is an enforced closure of the glottis by the overstimulation of the adductor centres, and the blood has become supervenous, it so acts upon the medulla as to bring the abductor centres into activity, and consequently to open the glottis and to re-establish respiration. This is the explanation of Jackson.

In analyzing, in the light of present knowledge, the various views relative to the causation of the affection, but one of these theories, that of peripheral irritation, put forth by Marshall Hall, is at all satisfactory. This irritation, in the production of central nervous diseases, has been amply illustrated by recent investigations of other nervous phenomena, such as asthma, hay fever, megrim and allied affections.

Other views relative to the causation of this disease, such as enlargement of the thymus gland, the softening of the occipital bones, thereby permitting pressure upon the brain, have been more or less fanciful, or the result of the investigation of cases in which this affection was simply coincident with these conditions.

The theory of the excitation of the central nervous disturbances by disturbed physiological conditions is, as we have seen, most ably explained by Hughlings Jackson. He, however, has studied the subject only from a physiological standpoint, and therefore fails to point out why it is that the nerve centre in the medulla controlling the abductor muscles of the larynx is more susceptible to irritation, or to its normal stimulus, than the nerve centre controlling the adductor muscles of the larynx. This we believe can be readily explained by the fact that these nerve centres are rendered thus susceptible by irritation of the larynx itself, and that more or less continued irritation of the larynx has the effect to excite these nerve centres to undue activity, so that an irritation of the larynx that would at first have no appreciable effect on the nerve centres, would, when the nerve centres had become irritable and hyperæsthetic, have the effect to produce abnormal effects in the parts under their control.

In the study of the natural history of the disease we will readily see that influences and conditions that predispose to the causation of laryngeal irritation and laryngeal disease are exactly the conditions that predispose to the production of laryngismus stridulus.

Laryngismus stridulus is of most frequent occurrence in ill-nourished and rachitic children, and during the early part of the year when the system is depressed by long confinement indoors, and when the atmosphere is most irritating to local affections.

Heredity has been thought, in some instances, to play an important part in its production, as when both parents suffered from it during their infancy. In cases where the majority of the children in large families have suffered from laryngismus stridulus, heredity may have much to do with the production of this affection; only, however, to the extent that the children inherit physical conditions that predispose to laryngeal irritation and susceptibility to nervous disturbances. In the cases where many children in the same family have suffered from this affection, it may be accounted for by the fact that the children have all been subjected to the same influences that produce local irritation.

Children subject to snuffles, and those prone to frequent colds in the head and to sore throat, are especially liable to attacks of this affection. This, as we can readily see, is accounted for by the well known effect of nasal irritation and nasal obstruction, combined with oral respiration, in the production of laryngeal irritation. We also observe that the attacks of laryngismus stridulus usually occur during the night, at which time intra-nasal turgescence most readily takes place.

We also see that various subjective conditions which may have the effect to cause irritation of the larynx, are liable to cause attacks of laryngismus stridulus, as in the case of peevish and irritable children who indulge in much crying, thereby breathing largely through the mouth; also the forcible oral respiration consequent on laughing violently, and in fact, all those conditions that tend to cause irritation of the larynx will produce attacks of this affection. Thus we see that all conditions that produce more or less prolonged irritation of the larynx, tend to produce in children a marked susceptibility to this affection.

We therefore conclude that in the causation of laryngismus stridulus we must have the following conditions:

1. A chronic irritation of the larynx.

2. An abnormal activity of the laryngeal motor centres in the medulla, rendering them more susceptible to the normal blood stimulus and also more sensitive to irritation applied to the peripheral nerve filaments as a result of irritation of the larynx.

3. An unequal susceptibility of the adductor and

[10] "On the Central Motor Innervation of the Larynx."
[11] Brit. Med. Jour., op. cit.

abductor muscles to local irritation and also to the normal blood stimulus.

The abductors of the larynx, situated on the outer portion of the laryngeal framework, are not so much subject to local irritation; their motor centre in the brain is less excited and less susceptible to normal stimulus, and thus, spasm of the abductor muscles is less frequent than spasm of the adductor muscles, and less persistent when it occurs.

THE TECHNIC OF CATHETERISM OF THE EUSTACHIAN TUBE, AND THE INDICATIONS FOR ITS USE.

A Clinical Lecture delivered at the Chicago Policlinic, August 2, 1892

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By catheterism of the Eustachian tube we understand the introduction of a properly curved tube into the tubal orifice, from 5 to 15 mm. according to the depth of the trumpet shaped opening of the pharyngeal orifice of the Eustachian tube.

Since our time is limited and you can readily find in your text books the historical details of this procedure, I will at once enter *in medias res.*

The necessary instruments for the proper performance of eustachian catheterization are, 1, the catheter; 2, the auscultation tube sometimes improperly called the otoscope and 3, the air bag.

Eustachian catheters are made of hard and soft rubber and of silver. Hard rubber catheters have the advantage of cheapness and lightness; they are not easily corroded. The aurist can supply himself with a number of all sizes and curves, so that each patient may have one to himself and thus escape the danger of possible infection. On the other hand the silver catheter if made of virgin silver, is much thinner than those made of hard rubber giving the important advantage of a larger calibre. Silver catheters are flexible, and any need to change the curve of the distal end is thus easily obtained in one instrument. It has the further advantage of being easily cleansed and sterilized by immersion in boiling hot water, or by holding in the flame of a gas burner (ausglühen.)

Again, they are not fragile like the hard rubber ones. It is very important to bear this in mind since it may happen that by a sudden motion or flinching or even the forcible grasping and extracting of the h.r. catheter by the patient the distal end may break off and remain imbedded in the tubal orifice, or serious tranmatism to the naso-pharyngeal or nasal mucosa may be entailed. Not so with the silver catheter, on account of its great flexibility.

The soft rubber catheter I will dismiss in a few words. They are difficult of introduction on account of their being too flexible, unless they are made so thick as to be clumsy and too large in diameter for the average nasal fossa, and the small size of their calibre.

The silver catheter, see Fig. 1, is usually made in three sizes being respectively 2, 2.5 and 3, mm. in diameter. The whole length of the catheter should be about 16 cm. and the length of curve at distal end is from 2 to 3 cm. and varies from 140° to 150°. The beak, (see Fig. 1) is olive-shaped and has the advantage over the usual square end, of being less liable to produce a traumatism and the possible consequent emphysema. The indicator ring at the proximal end serves the purpose of indicating the direction of the beak and is usually placed in the axis of the curve of the catheter.

The silver catheter as described is made by Sharp & Smith after the German model.

The air bag I here show you and which has been used in this clinic for several years is known as the Lucae double balloon (see Fig. I). It is composed of a heavy rubber bulb with an automatic valve at b.; the second bulb is called the balloon, and is supplied with a similar valve at a. It is covered with webbing so as to prevent rupture by over filling. By means of this balloon, we not only get a continuous supply, but also an increased pressure of atmospheric air by compression of the balloon, which can be nicely graduated and regulated at will. The continuous atmospheric pressure obviates the necessity of disconnecting or removing the air bag from the catheter as must be done after each compression when using the Politzer bag. It also has the advantage over the Politzer in permitting of a more accurate observation of the auscultatory sounds, in consequence of the absence of the supplementary noises made during the acts of swallowing or phonation which are unavoidable in Politzerization.

Another advantage of the Lucae air bag is its simplicity and convenience. A short distance above the second bulb or balloon is a hook by which the air bag can be suspended from a button hole in the lapel of the coat (see Fig. 1 d.). At the distal end of the rubber tubing is a tip (see Fig. 1. "c.") which should be made to fit accurately into the funnel shaped end of the catheter.

The auscultation tube (also called the diagnostic tube) consists of rubber tubing made of pure gum. It should be about 120 cm. long and from 8 to 9 mm. outside diameter, that being the size that will fit into the average external meatus. The end pieces of different color usually recommended in the text-books are a disadvantage unless the calibre of these end pieces is nearly equal to that of the rubber tubing. Schwartze and other eminent aurists dispense entirely with the end pieces and prefer to mark the ends of the tubing for patient and operator by making the cut ends respectively oblique and straight.

One end of the auscultation tube is held snugly in the external meatus of the ear to be catheterized, while the other end is brought around and behind the neck, and over the shoulder into the corresponding ear of the examiner. This disposition of the latter end makes it less liable to slip out or being dragged out by gravitation and therefore makes it more secure.

Although Roosa (*loc. cit.* page 76) does not consider the auscultation tube a necessary adjunct to successful catheterism of the Eustachian tube, yet its importance will be conceded when we consider the following facts which our extensive clinical material has established beyond peradventure viz:

1. By means of the auscultation tube we are enabled to determine absolutely, whether the distal end of the catheter is properly engaged in the t. o.[1]

2. To diagnosticate the perviousness or patency of the E. t.[2] which can be quite accurately determined by the pitch of the auscultatory sound or a stenosis

[1] t. o. stands for tubal orifice.
[2] E. t. stands for Eustachian tube.

of the E. t. by the amount of atmospheric pressure required to overcome the resistance.

3. Condition of the mucosa of the E. t. and middle ear cavity; whether moist or dry, or whether there is present much or little fluid. Moist râles indicate an excess of fluid caused by the admixture of air and fluid contents of c. t.[3] If contents are serous, the râles are fine, if mucous they are more like vesicular breathing ("*bruit de pluie*," "*Regensgerausch*" from its resemblance to the falling of rain through the leaves of a tree). These râles must not be confounded with those produced at the t.o., when the beak of catheter is not properly engaged but lies near or in the lumen of the ostium.

4. When the sound is intermittent, with explosive noises during the act of swallowing it may indicate stenosis from swelling of the mucosa in cartilaginous portion of the E.t. or near the ostium tympanicum. Explosive sounds may also be due to sudden tension of m.t.[4] or when there are adhesions between it and the inner wall of the c.t.

5. A whistling or hissing sound will indicate a perforation when it is small. Where the perforation involves all or a greater portion of the m.t. without any appreciable moisture in c.t. the auscultatory sound may simulate that of a normal and patent E.t.

6. If in the presence of a pervious E.t. (which can be determined by a bougie) there is an obscuration of the usual auscultatory bruit we may assume that the c.t. is occupied by some inflammatory product or the space compromised by swelling or proliferative thickening of the mucosa.

So much for the diagnostic use of catheterism. It also aids us in our prognosis in so far as we can determine absolutely or approximately the pathological conditions which obtain.

Let us now consider briefly the therapeutic indications for Eustachian catheterization.

1. One of the principle indications for its use and in the patient before us is a sense of fullness and pressure with tinnitus and deafness. These symptoms are usually due to disturbance of the equilibrium of atmospheric pressure in the middle and external ear from defective ventilation of the c.t. by way of the E.t., giving rise to diminished air tension and consequent hyperæmia *in vacuo* with more or less collapse of the m.t., and consequent involvement of the apparatus of hearing made manifest by impairment of the aerial conduction of sound.

2. In acute otitis of the middle ear, as soon as the acute pain has been relieved by the usual treatment, the air douche is indicated. Where the otitis is unilateral, catherization is to be prefered to Politzerization. Catheterization secures perviousness of the E.t., establishes the equilibrium of atmospheric pressure, thereby relieving tension of the m.t., the tendon of the tensor tympani muscle, also chain of ossicles and undue pressure on the labyrinthine windows; it disperses and displaces intratympanic exudations *via* the E.t. into the pharynx, or in the presence of a spontaneous or artificial solution of continuity of the m.t., into the external meatus; it establishes normal intra-tympanic pressure with consequent reduction of hyperæmia *in vacuo*, absorption of exudation and by virtue of what might be appropriately called aural massage, viscid mucous and plastic exudates are displaced and removed from the immediate vicinity of the oval and round windows and foot plate of the stapes which tend to more or less compromise the function of the apparatus of hearing. Plastic exudations are prevented from becoming organized and forming bands of adhesions between the m.t. and inner wall of the c.t. or immobilizing the maleo-incudal incudo-stapedial joints.

3. In chronic catarrhal otitis of the middle ear it forms the most important factor in the treatment. The rationale is the same as that mentioned in acute otitis. Perhaps the element of mechanical pressure (aural massage) is of greater moment in the treatment of the chronic forms of otitis media, especially where their is much swelling or proliferative thickening of the tympanae mucosa. It prevents the fixation of the chain of ossicles and secondary tympanic membrane (the membrane covering the round window) by connective tissue proliferation; it also prevents stenosis of the ostium pharyngeum and ostium tympanicum of the E.t. as well as in its continuity.

4. In deafness and tinnitus caused by the above mentioned pathological conditions, it is the only treatment that will prove of any avail. If it does not cure the deafness and tinnitus it will most certainly in the majority of cases relieve them, and prevent rapid progressive impairment or entire loss of hearing.

5. In acute-suppurative otitis of the middle ear catheterization and careful inflation may induce dispersion and absorption of sero-purulent exudate without perforation. Where, however, there is a perforation, the purulent secretion is displaced into the external meatus from whence it is removed by irrigation with a ¾ per cent. solution of sodium chloride or a 2 to 3 per cent. solution of boric acid, or by pledgets of borated cotton, secundum artem. It furthermore establishes the desirable intratympanic conditions which favor subsidence of hyperæmia and stimulates absorption of abnormal exudations.

6. In chronic suppurative otitis the same indications obtain as in the acute form, the rationale being the same. In addition, catheterism also furnishes the means for irrigating the c.t. by way of the E.t., as recommended by Schwartze, *loc. cit.* 194.

You ask, how soon should inflation be repeated?

As a result of clinical experience we find that the improvement after the first few catheterizations (that is in otitis media chronica) usually lasts from a few to 24 hours and recedes again. It is therefore advisable to repeat the inflation, indeed before the benefits of the preceding one have entirely disappeared, otherwise your patient would remain in a condition of *statu quo* or the improvement would be at least very slow. It is advisable to inflate daily for five or six days, or until such time as the improvement is more or less permanent, when the interval can be prolonged according to the progress or exigencies of the case. Therefore, in the chronic forms of Otitis media catarrhalis and suppurativa you must continue in this line of treatment for a long time, or as long as the pathological conditions that obtain compromise the sense of hearing or the integrity of the temporal bone.

In this connection I wish to call your attention for a few moments, to the contra-indications of

[3] C. t. stands for cavum tympani.
[4] M. t. stands for membrana tympani.

Eustachian catheterizations, and will divide them for more convenient study, into absolute and relative.

Absolute.—1. When there is ulceration in the nose or naso-pharyngeal cavity with or without tendency to hemorrhage, on account of the danger of septic infection. 2. hyperpyrexia. 3. Acute otitis complicated by acute pharyngitis and severe otalgia. 4. Emphysema of pharynx or larynx.

Relative.—1. Early childhood. 2. Senility. 3. Neurotic conditions. 4. During convalescence where there is great nervous prostration.

As to the technic of the procedure you know, gentlemen, that the pharyngeal orifice of the E.t. is located on the lateral wall of the naso-pharynx, nearly on a line with the inferior meatus of the nose, and that between the posterior lip of the ostium (also called the salpingo-pharyngeal fold) and the posterior wall of the naso-pharynx is a depression called the fossa of Rosenmüller. If the distance from the anterior nares or the posterior wall of the pharynx to the t.o. was uniformly a fixed one (which, however, is not the case) there would be no difficulty in finding it by means of a fixed scale on the catheter. Therefore, we proceed after a method (of which there are a number) that establishes a fixed point or landmark as a point of departure for the *maitre de tour*.

The method that is taught in this clinic is known as the modified Kramer or Gruber method. The patient should be seated well back in a chair with body erect. It is desirable to have the patient blow the nose so as to cleanse nasal passage and to moisten the same.

The catheter having been scrupulously cleansed and sterilized, make sure that it is pervious by forcing air through it from the air bag (not by the mouth for that would not be aseptic) then adjust the auscultation tube as noted; place your left hand on the patient's forehead and with the thumb raise the tip of the nose; grasp the catheter delicately at its proximal end between thumb and index finger of the right hand holding it nearly perpendicularly, with the beak resting at the outer side of the floor of the vestibule, make an upward and forward motion carrying beak over the muco-cutaneous fold (the junction of the vestibule and nasal floor proper) at the same moment bringing the catheter to a horizontal, on a plane with the floor of the inferior meatus and continue the forward motion *with beak hugging the floor* until it reaches the naso-pharynx and you feel the resistance of the posterior pharyngeal wall; the catheter, with the indicator ring pointing directly downward and on a horizontal plane, is then drawn forward until the resistance of the soft palate is felt, when without hesitation it is turned outward and upward through the arc of a circle of about 135°, so that the indicator ring is on a line with the outer angle of the eye, or at an angle of 45°, when the beak of the catheter will usually glide into the t.o. The latter movement is aided somewhat by the contraction of the palatal muscles which, so to speak, lifts and rides the distal end of the catheter toward the t.o.; then, sliding left hand downward over forehead (not raising the hand from its support) grasp the catheter firmly between the thumb and index finger to prevent motion or rotation on its axis while making connection with the tip (see Fig. 1, *c*) on the Lucae air bag, at the same time keeping the tips of the remaining fingers fixed against the glabella as a fulcrum. On compressing the bulb and filling the second balloon moderately with air the auscultation tube will at once determine the success or failure of the manœuvre.

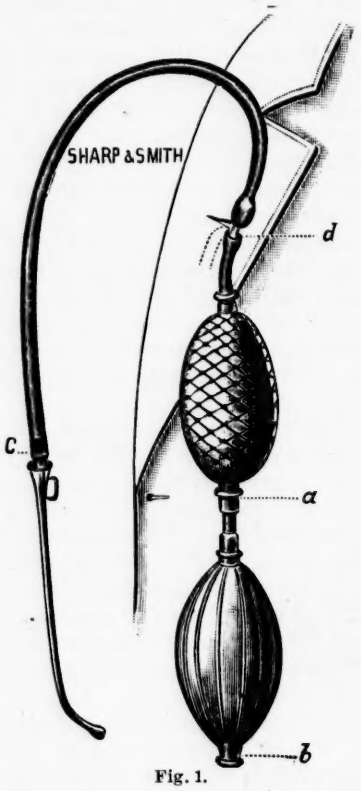


Fig. 1.

I will in this connection, without comment, mention in brief some of the other methods of procedure.

In the Lowenburg method you proceed as in the one before mentioned, until the beak of the catheter meets the resistance of the posterior pharyngeal wall, when it is rotated inward through the arc of a circle of 90° and brought forward until the concavity of the curved distal end meets the resistance of the posterior margin of the septum nasi (which in this method is the landmark), it is then rotated downward, outward and a little upward, describing a little more than a semi-circle, with indicator ring at same angle as in the previous method.

In Kuh's method, the beak, after meeting with the resistance of the posterior pharyngeal wall, is turned outward into the fossa of Rosemneüller; it is then brought forward until the resistance of the posterior lip of the t.o. is felt, when it is drawn gently over the lip or fold into the t.o. By this manœuvre there is more or less danger of injury to the mucous membrane sufficient sometimes, to entail the serious consequence of emphysema, especially where this landmark is unusually developed. The following method of Bing is an improvement on the latter. You will proceed as in the previous method until the posterior lip is plainly felt, which can be more easily discerned, by carrying the proximal extremity of the catheter toward the septum, when it will be noticed that on slight traction, the beak being directed slightly downward, that it can be made to glide easily downward and around the posterior lip, and circumducted, so to speak, into the t.o. The greater the development of this land-

mark (the posterior lip) the easier and more certain is catheterization by the Bing method.

Gentlemen, you must not forget that familiarity with, and dexterity in these methods of procedure are absolutely essential to success; that that method is the most desirable, that accomplishes catheterism with ease and without pain, "tuto, cito et jucunde."

As you become expert in the manœuvre you will not confine yourself to any particular method, but will proceed more or less unconsciously and independent of any special landmarks, as after the method of Boyer or Gairal, in which the catheter is passed along the floor, being held somewhat obliquely so that the convexity of its distal extremity is upward and inward and the concavity downward and outward, until the distal end reaches the naso-pharynx when it is turned outward and upward into the tubal orifice.

A knowledge therefore of the topography of the nose and naso-pharynx and a practical experience in the procedure are the only means that will insure success.

705 Venetian Building.

EYE TROUBLES WHICH CONSTITUTE A FREQUENT SOURCE OF HEADACHE, VERTIGO AND NAUSEA, AND OTHER NERVOUS DISORDERS.

Series of four lectures delivered at the Fourth Special Course of the Chicago Policlinic.

BY F. C. HOTZ, M.D.,
PROFESSOR OF OPHTHALMOLOGY.

LECTURE II.—STRAIN OF THE OCULAR MUSCLES IN BINOCULAR VISION.

Second Group:—The ocular affections to which I wish to invite your attention to-day, create disturbances in the nervous system also by strained muscular action. But while a person with abnormal refraction may suffer from nervous symptoms whether he sees with one eye or with both, the group of affections now before us can trouble the person only when he uses both eyes together. *The nervous symptoms caused by this second group are due to unusual demands upon the ocular muscles to maintain binocular vision.*

Binocular vision is only possible if the visual line of each eye (i. e. the straight line drawn from the macula through the center of rotation of the eye) connects the macula with the object, or as it is usually expressed, both eyes must be turned directly towards the object. The slightest deviation of the one visual line from the object disturbs binocular vision by causing diplopia, as you may easily prove to yourselves by a very simple experiment. Place one finger very lightly on the upper lid of your left (or right) eye, and then make with this finger the faintest pressure upon the eyelid while you are looking steadily at one object. You will at once see the object double, because the pressure upon the lid is transmitted to the eyeball, causing a slight displacement which faint though it be is sufficient to change the direction of its visual line and thus to cause double vision. When the object is far away from the eyes, the direction of these visual lines is so slightly convergent that it is customary to speak of them as being parallel. The nearer the object approaches the eyes, the more convergent must be the visual lines; and hence in looking around from one object to another, we are constantly changing the position of our visual lines. The movements the eyeballs have to make for these adjustments of the visual lines, are effected by the actions of the four straight and two oblique muscles. Under normal physiological conditions, these muscular forces are so well balanced that when the muscles are in a state of physiological relaxation the visual lines are practically parallel; if, therefore, we look at distant objects, these muscles are pretty well at rest, and they become active in proportion as the object gets nearer to the eyes. And as we frequently change looking from near to distant objects, the ocular muscles undergo so frequent changes of tension and relaxation that they can easily meet the demands imposed upon them in the interest of binocular vision.

Now in the affections which interest us to-day, this physiological equilibrium of the ocular muscles is slightly disturbed; the visual lines are not parallel when the muscles are in a state of perfect relaxation, but the visual line of the one eye is slightly turned upwards or downwards, convergent or divergent. But these departures of the visual lines from parallelism are so slight that they do not cause any manifest deviation (as in strabismus) and for the sake of binocular vision can be and are corrected, and the parallelism of the visual lines is restored by persistent special efforts of one or the other of the ocular muscles. For instance, if in the state of muscular rest my right eye was just a little convergent, my sight would be confused in a peculiar way in looking at a distant object, because its image would not be received exactly on identical points of the two retinæ; in the left eye the image would be on the macula, but in my right eye it would be on the nasal side of the macula. And while the left eye would see the object in its true position, my right eye would see it slightly shifted to the right, according to the laws of projection; but the shifting would probably not be great enough to produce distinct double images; the two images would neither be distinctly separated nor exactly blended, they would overlap each other and make the object appear to me in very uncertain contours, like blotted type. To get rid of this very distressing state of vision I must bring the visual line of my right eye to bear directly on the object, and I should accomplish this by inducing the external rectus of my right eye to make a special effort to turn this eye just so much that the image of the object is thrown upon the macula. The visual lines of both eyes then connect the object with the macula, and binocular single vision is restored. But it is restored at the expense of the external rectus of my right eye which is obliged to keep up a certain degree of tension to oppose the natural tendency of the eye to turn in. And as this extra tension had to be kept up all day, it would not be surprising if sooner or later this strain upon the external rectus muscle would lead to similar nervous symptoms which, as you have learned in our first lecture, are so often caused by the strained efforts of the ciliary muscle. And so we find it in reality: headaches, neuralgia, vertigo, and the whole train of neuroses indicative of an unusual and excessive consumption of nerve force are frequent complaints of persons whose eyes show these peculiar disturbances of the muscular equilibrium.

Dr. G. T. Stevens[1] has introduced a series of new terms for these muscular anomalies; and since his terms have been adopted by other writers, and also by the ophthalmological Section of the American Medical Association, I will briefly explain them. The state of perfect muscular equilibrium is called *Orthophoria*, and all those disturbances of equilibrium which favor the deviation of the one visual line from the other, but in which this tendency is opposed and the actual deviation prevented by special muscular efforts, are grouped under the general term *Heterophoria*. According to the direction in which the deviating tendency may exist, heterophoria may be subdivided into:

1. *Esophoria.*—The visual line of the one eye has a tendency to turn inward (convergence).

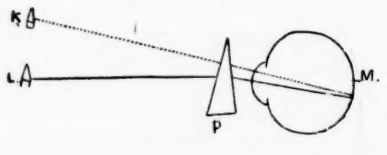
2. *Exophoria.*—The visual line of the one eye has a tendency to turn outward (divergence).

3. *Hyperphoria.*—(Right or left)—The visual line of the one eye has a tendency to turn upward.

As these faulty tendencies are counteracted by muscle strain as long as binocular vision can be maintained, the existence of heterophoria in any given case can only be revealed if binocular vision is suspended by some artificial means. A very simple and inexpensive contrivance for this purpose is Dr. Maddox's glass rod, a small piece of a glass cylinder set in a slot of a round metal disc. If you place this glass rod before your right eye and look at a light, you will see a long streak of light, while with your left eye you will see the natural shape of the flame. If the glass rod stands vertically, the light streak is horizontal, and if the rod stands horizontally, the streak is perpendicular.

Now for binocular vision, both eyes must receive identical images on the macula; but a light streak and a flame are so different images that they cannot be united into one visual perception. Binocular vision, therefore, is suspended by the glass rod; but as soon as binocular vision is made impossible it matters not whether both visual lines are directed towards the light, or whether one visual line is turned in another direction. We therefore see that under the influence of this glass rod any special effort which may have been made in the interest of binocular vision to prevent the deviation of the visual line, is abandoned, and the deviation if the tendency therefore exists, is allowed to take place. In orthophoria the streak is seen to pass right through the middle of the light; but if heterophoria exists, streak and light are seen separated, and the position of the

FIG 4



streak (whether above or below, to the right or left of the light) will determine the kind of heterophoria.

Another way of suspending binocular vision is to induce diplopia by means of prisms. A prism deflects the rays of light towards its base. If you place a prism (p) with its base downward, before one eye, for instance, before the right eye, the rays from this candle light (l) are deflected so that its image is cast upon the lower portion of the retina (below the macula) of the right eye; you will see two lights, and the one seen by the left eye will appear in its true place (at l) and the one seen by the right eye will appear above the other (at k). Binocular vision being suspended by the prism, any existing heterophoria will reveal itself by the relative position of the double images, as I shall show to you presently. For this prism test Dr. Stevens has devised this instrument called *phorometer* with which you can not only detect very quickly the existence of heterophoria, but also very accurately determine its kind and degree.

Let us now briefly consider the principal forms of heterophoria.

ESOPHORIA.

The visual line of one eye has a tendency for convergence.

Tests.—1. The vertical light streak produced by the glass rod is seen to the right of the light if the rod is before the right eye, and to the left of the light if the rod is before the left eye.

2. The double images (produced by the prism with its base down before one eye) are not in perpendicular line, but the upper image appears displaced to the right if it belongs to the right eye, or the left if it belongs to the left eye.

To get the images on a vertical line, or to make the light streak run straight down through the flame, you have to place a prism with its base towards the temple, before one eye, The number of the prism which brings both images in a perpendicular line indicates the degree of esophoria.

In esophoria, binocular vision is maintained by the constant tension of the external recti muscles. In moderate degrees relief may be obtained from the use of prismatic spectacles; in the higher degrees of esophoria, carefully graduated tenotomies of the internal recti muscles correct the deviating tendency.

Prominent among the nervous symptoms induced by esophoria, is severe pain in the back of the head. Sometimes this occipital headache comes after reading with such regularity that the patient naturally concludes there must be some relation between the eye work and headache. In many cases, however, the patient experiences no trouble in reading, etc., and has very good sight; but a visit to a picture gallery or a theatre, the attendance at a lecture-room or in church, is invariably productive of a severe headache.

Let me briefly relate to you two cases to show the different effect esophoria has on different people, and also the different means by which relief can be obtained.

Case 1.—P. O., 17 years of age, has been suffering from temporal and occipital headaches more or less for years, but since he has entered college the attacks have become so frequent and severe that he was often obliged to interrupt his studies; he had noticed if he read in the evening he would always wake up with a headache in the night, and if he studied for one hour in the afternoon, he would usually have to suffer for it in the evening. The headache was often preceded by a numb feeling in the fingers which gradually extended up the arms to the shoulders. At the age of 8 years he had been operated upon for convergent strabismus of the left eye. His vision was excellent ($\frac{20}{15}$) and the refraction emmetropic, with accommodation fully paralyzed. At first we found esophoria

[1] Functional Diseases, their causes and ttreatment. New York, 1887.

2° but in a few days it gradually increased to 10°. Graduated tenotomy of both internal recti produced orthophoria, and as he reported six months later, relieved him permanently of the headaches and other neurotic symptoms.

Case 2.—Mrs. F., 23 years old, has no trouble in reading except that her eyes begin to burn and smart; but has been troubled with violent sick headaches all her life; never went to the theatre but what toward the end of the play her head would ache.

Examination, Jan. 28; esophoria 7°; good vision ($\frac{20}{20}$); under cocaine and homatropine, hypermetropia 2 D, and esophoria 14° (!).

Feb. 1.—Had severe headache after examination with the homatropine. With H. corrected still Es. 7°. *Ord.* prism 3° for each eye.

Feb. 9.—Several evenings in theatre, and no headaches.

March 15.—Glasses continue to give perfect comfort.

EXOPHORIA.

The visual line of one eye has a tendency for divergence.

Test.—1. The glass rod shows the vertical light streak to the left of the flame if the rod is put before the right eye, and to the right of the flame, if the rod is put before the left eye.

2. The vertical double images produced by the prism, are so displaced that the higher image appears to the left if it belongs to the right eye, and to the right if it belongs to the left eye.

A prism placed with its base toward the nose before one eye can get the two images in a vertical line, and also make the light streak pass through the flame. The value of this prism represents the degree of exophoria.

The deviating tendency of the visual lines is opposed by the requisite constant tension of the internal recti muscles. Its relief requires either the appropriate prismatic spectacles, or carefully graduated tenotomies of the external recti muscles. Exophoria is preëminently embarrassing in near work, causing quick fatigue, and pain in the eyes and head, in fact that train of symptoms usually mentioned in the text books under the heading "Muscular Asthenopia."

A very good clinical illustration of exophoria is the following case: In August of last year, a physician 34 years old, from Iowa, came to get relief for these symptoms: A constant tight feeling across the forehead; when looking at any object he had a desire to close his eyes to rest them; could read but a few lines, and scarcely able to write prescriptions because "the letters chase each other." The examination revealed normal refraction; perfect vision ($\frac{20}{15}$) and 2 degrees of exophoria. A prism of 1° for each eye gave such instant relief that the doctor wished to go back home with them at once, promising to report, or to return if the glasses should fail to give permanent relief. But he is not likely to come back, for on Feb. 28 he wrote this: "I could not live without my glasses now, they give me perfect comfort; can't be without them. If I lay them aside for a moment my eyes and forehead begin to pain again. But when I wear them there is no pain whatever."

HYPERPHORIA.

The visual line of one eye has a tendency to turn upward.

Tests.—1. The *horizontal* light streak seen through the glass rod appears above or below the flame; and,

2. If diplopia is produced by a prism placed with its base toward the nose before the one eye, the two images do not appear on a horizontal line (as they would in orthophoria) but the right or the left image stands higher than its partner. The lower image always belongs to that eye whose visual line is directed above the visual line of the other eye; and a prism placed with its base down before that eye will bring the two images in a horizontal line (and also make the horizontal light streak pass directly through the middle of the flame.) This prism represents the degree of hyperphoria.

Hyperphoria is by all means the most interesting of all the heterophoric conditions, because even very slight deviating tendencies of the visual lines in the vertical direction are very embarrassing to binocular vision, and frequently induce very troublesome nervous symptoms. Preëminent among those is vertigo and a peculiar confusion or uncertainty of vision, which makes walking in a crowded street a very difficult and dreaded task for such people. Some patients compare this visual vertigo with the sensation experienced on board of an ocean steamer; others only notice a peculiar unsteadiness and haziness of the horizon when they look with both eyes, while it appears perfectly clear and sharp when viewed with either eye alone. Some have a more or less constant feeling of a tight band around the head; others are tortured by frequent attacks of violent occipital headache.

How embarrassing a slight degree of hyperphoria may be, I cannot illustrate any better than by relating to you the following observation: In September, 1889, H. K., 34 years old, an actor, consulted me at the suggestion of his physician. Since two years he had been annoyed by frequent attacks of vertigo, which were extremely embarrassing to him. When on the stage he felt as if his body was swaying from side to side, and when he had to make his exit in a certain direction, he had to fix his eyes right to the spot, strain every muscle to walk straight toward the place where he was to leave the stage. He was always afraid the audience would notice the uncertainty of his gait, and think he was intoxicated. He was a man of splendid physique, and a number of competent physicians who had examined him from head to foot, inside and outside, could find no flaw in his organization. His eyes showed normal refraction, and remarkably good vision, ($\frac{20}{12}$); but there was $\frac{1}{2}$° of hyperphoria of the L. E.; and when this was corrected by $\frac{1}{2}$° prism, he was quite amazed by the wonderful change of sensations it produced. Everything appeared so steady and clear; his head felt as if a heavy weight had been lifted from it, and every trace of vertigo had disappeared.

In dealing with these heterophoric conditions, we must not lose sight of the fact that a weak state of health, poor nutrition, nervous prostration by disease or overwork, may weaken the ocular muscles so that they are easily tired in the performance of their regular daily work. Their actions become unsteady, jerky and easily simulate heterophoria of one kind or another. But if you examine such eyes on different days (and in all these muscular affections, you should never make your diagnosis on one single examination) and find each examination shows a very different degree or even a different kind of hetero-

phoria; you will understand that this is not a case of true heterophoria. Another point we must not overlook, is the fact that apparent heterophoria is often associated with errors of refraction, and disappears when these errors are corrected by suitable glasses.

But after all these cases have been carefully sifted out, there still remains a certain number (like the cases reported in this lecture) in which the most searching examination can detect no other disturbance in the eye but heterophoria, and in which the correction of this muscular disturbance is promptly followed by the complete relief of existing disturbances in the nervous system. I wish to impress this fact upon your mind with particular emphasis, because some writers, utterly disregarding these clinical facts, are trying to make their readers believe that heterophoria has no bearing on asthenopia or nervous symptoms, but that these complaints are always caused by anomalies ot refraction, and relieved by the correction of the refractive errors.

NOTES ON THE EUCALYPTUS.

BY W. C. TYNDALE.
OF CHICAGO, ILL.

The Eucalyptus tree is a native of Australia and Tasmania, where it forms large forests. There are about 140 species described, but they vary extremely, different kinds of leaves being produced on the same tree, thus presenting distinct specific characters, and varying also in the nature of their barks.

In Tasmania and Gippsland Victoria, they grow to an immense heighth, often exceeding 400 feet. Their naked and branchless stems of a dirty white color look like natural columns. These are often blackened by the fires of the natives or wrung by the settler's axe, when they afford a grand but dismal spectacle, as one speeds along in the train; in some districts square miles of country is passed in which the forests have been wrung preparatory to settlement, and in some cases for no obvious reason, as the land is unfit for occupation and there stand those former monarchs of the forest like giant skeletons, sapless, lifeless looking, dismal and forlorn in the midst oftentimes, of a luxuriant undergrowth.

The trees are named usually according to the nature of their bark, which they shed instead of their leaves, such as Stringy Bark (E. Obliqua), Iron Bark (E. Sideranylon), Blue Gum (E. Globulus), Peppermint tree (E. Amygdalina).

The wood of some is very hard and durable, and so heavy as to sink in water. Many yield a kind of resin or gum, such as E. Resinifera and E. Amygdalina. A volatile oil of wonderful medicinal qualities is also produced from the leaves of various kinds but more especially from that known as the E. Amygdalina which is the most productive, and yields nine-tenths of the oil of commerce, though not always placed in the market under its own name.

This arises from a certain amount of notoriety gained for the E. Globulus abroad owing to the fact that it is the easiest of the species to acclimatize. As a matter of fact, however, there is scarcely any E. Globubus distilled in Australia. E. Maunifera yields sweet secretions analagous to manna. E. Gunnii furnishes a liquid that ferments and forms a kind of beer. They all produce abundance of seed, which vegetates freely and becomes naturalized in various countries.

THE GIANT EUCALYPTUS TREE.

The E. Amygdalina or Giant Eucalyptus, called "Waugara" by the natives, is also known as the Peppermint tree. This is one of the most remarkable and important of all the plants in the whole creation.

Viewed in its marvelous height when standing forth in its fullest development on the slopes or within the glens of mountain forests it represents probably the tallest of all the trees of the globe. Regarded as a hard wood tree of rapid growth it ranks foremost, and contemplated in respect to its yield of volatile oil from its copious foliage it is unsurpassed and perhaps unequalled by any tree in the world. These qualities have made it become generally known and much through the exertions of Baron Von Mueller, this tree is now being introduced abroad with good results in countries neither subject to severe frost or intense moist heat. It assumes under different climatic and geologic conditions, various forms. Thus, in the ravines of the cooler ranges it attains its greater height, combined with a perfect straightness of stem, while the bark strips so completely as to render the huge stem quite smooth and almost white.

In the more open country it is much smaller. Under these conditions it is called a "Peppermint Tree" in Victoria and Tasmania, and a "Messmate Tree" in New South Wales.

In Victoria this tree often exceeds 400 feet in height. Such trees are found on the Black Spur, Upper Yarra Yarra, and Upper Goulbourn. A fallen tree on the Dandenong Ranges measured 420 feet. The length of the stem up to the first branch was 295 feet. The diameter of the stem where it was broken 365 feet from the root was three feet.

A still thicker tree in the same locality measured 53 feet in circumference three feet from the ground.

A tree near Mount Wellington, Tasmania, has been found which measured 12 feet in diameter, 220 feet from the ground. Another tree was found 130 feet in circumference at the base. Within a square mile 100 trees could be counted with a circumference of at least 40 feet. At the foot of Mount Baw Baw, Victoria, is found the highest of the giant trees of Australia. This monster is 471 feet high, and another on the Cape Otway ranges is 415 feet in height. The final height is sometimes attained by a single branch pushing skyward.

It is a grand picture to see a mass of enormous tall trees of this kind with stems of mast-like straightness and clear whiteness so close together in the forest as to allow them space only towards the summit to send their scanty branches and sparse foliage to the free light.

The distillation of the oil was first initiated by Baron Von Mueller. E. Amygdalina yields more oil than any of the other varieties, and is therefore almost solely employed for the purposes of distillation. It is also one of the best for subduing malarious effluvia in fever regions, although it does not grow abroad quite so well or quickly as E. Globulus.

The respective hygienic value of various trees may to some extent be judged by the percentage of oil in their leaves as stated below.

	Per cent. of Oil.
E. Amygdalina	3.313
E. Oleosa	1.250

	Per cent. of Oil.
E. Leucoxylon	1.060
E. Goniocalyx	.914
E. Globulus	.719

The lesser quantity of oil in E. Globulus is compensated for by the vigor of its growth, and early copiousness of its foliage. It readily adapts itself to other climates and hence abroad nearly all varieties of the oil are known as Globulus. During the last twenty years the Blue Gum has come into high repute as a sanitary tree. A high authority states that the sewage system of large towns in warm climes would be simplified if each house had the ever green gum tree in the back yard. The disinfecting and deodorizing virtues of the tree are unquestionable.

Flesh of any kind is as well preserved by eucalyptus as by creosote, while beef sprinkled with it will dry hard without putrefaction. It is fatal to bacteria and other microörganisms. It may be injected into the veins and arteries of cadavers for purposes of preservation. It is also a good admixture in dressing gangrene.

SOCIETY PROCEEDINGS.

American Electro-Therapeutic Association.

Second Annual Meeting, held in New York, October 4, 5 and 6, 1892.

WILLIAM J. MORTON, M.D., PREST.

FIRST DAY, OCTOBER 4—MORNING SESSION.

(*Continned from page 48.*)

2. *Electrolysis.* By this term is meant not alone the products of chemical decomposition at the electrodes but also the action of the current in its intrapolar course. There can be no doubt that every current, however small, acts upon the tissue included between the electrodes. In the first place there would exist no current, no conduction, unless the electricity moved *with* the atoms of matter and not through and among them. This is the essential feature of electrolytic conduction as in the fluids and semi-fluids of the body. Therefore, the atoms move as long as a current passes.

Again, the phenomenon of internal polarization and counter electromotive force (as high as one-fifth of a volt) demonstrates the intrapolar activity of the continuous current. The effect of this action upon a tissue, for instance a muscle, is proven to be a great diminution of its excitability and a profound alteration in its structure, microscopically demonstrable.

3. *Cataphoresis.* The fluids of the human body, varying according to their electrical resistance, move with the flow of the current from the positive to the negative pole.

Electrolysis, chemically and cataphoresis mechanically alter the amounts and distribution of that very small percentage of salts essential to the nutrition and function of parts of the organism upon which they act and thus produce tissue changes, as in tumors and exudations.

4. *Vaso motor effects*, are too familiar to more than require mention.

Further objective evidence might be adduced such as the important action of electricity upon the pulse, upon the temperature and upon the secretion of urea and other end-products of metabolism.

Again, the evidence of clinical observation is of great weight.

But the time at my disposal and the limits of your patience, forbid the further pursuit of this train of thought. The field is too broad a one for this brief treatment. I would like to have referred to the medical possibilities of electricity in its relations to microbes and microbe chemical products; to the recent attack upon electro-theraphy as upon all therapy founded upon that recognized therapeutic measure known as "suggestion," but, as I have said, my time is too short and I will content myself with a mere reference to a line of work which lies before us.

Certain directions of investigation point to a field where electricity may play an important rôle in the cure of disease. To-day much attention is divided between an organization the most complex—the nervous system and one most simple—the animal cell. The former has long held sway as the great controller of those functional processes incident to the life and the activity of the organism, but the latter is found to possess distinctive capacities of its own which would suggest that in all that relates to the performance of vital functions it could act independently of the influence of the nerves. The capacity of an amœba to select nutrition appropriate to itself, of an intestinal epithelial cell to pick out fat globules to the exclusion of other material and of a leucocyte to attack and destroy a microbe are examples of this independent action. The natural history of animal cell life and the possibility of its modification by electricity is an inviting field for study. If the leucocytes in a living being may be anæsthetized by chloral so that they are unable to do their work they may likewise be exhausted or revived by the electric stimulus. And what is true of the lencocyte is true of other animal cells, if not all, which go to constitute our several tissues. Who shall say that the primary impulse of a nervous centre is not initiated by a capacity in the nerve cell as individual as that exercised by the amœba, the epithelial cell or the leucocyte. Indeed, if this initiative capacity to perform certian work is not inherent to the cells of the nervous system we must retreat to an immaterial principle underlying the phenomena of nervous action and hypothecate a sort of metaphysical *nervi nervorum.* It is then to an effect upon the life history of the cells involved in a given morbid process that we may look to for well known remarkable effects of electricity upon nutrition and a consequent modification of the processes of disease.

It is not improbable that a final field of contest in the cure of disease is between the physical phenomena we term electric and the chemico-biological processes of metabolism exhibited by the animal cell—between electricity on the one hand, which in the human body, by electrolytic conduction, becomes a chemical process and the chemical processes on the other hand, which constitute life in the organism—chemistry against or in conjunction with chemistry. From this point of view, much of electro-therapy becomes cellular therapy, in which electricity is the active agency in producing results which in general we term nutritional; and the explanation of the cure of curable diseases is to be found in the tendency of palliation and cure to be measured by the degree of nutritive improvement effected. The electro-therapy of the future must include acute as well as chronic diseases. Paradoxically, we may put the statement, cure the patient's body and we cure his disease. It is upon this great and broad general principle and not solely upon specific local effects that I believe the future success and position of electricity in medicine must be based. May we not term this process electro-cellular therapy?

REPORT OF THE COMMITTEE ON STANDARD COILS.

As the Committee had been unable to formulate a report, the members were asked to express their individual opinions.

Dr. A. H. Goelet, of New York, said that the difficulties which they had to contend with were best understood by those who had endeavored to secure a perfect faradic apparatus for medical use. The manufacturers, with the exception of the Chloride of Silver Dry Cell Battery Co., of Baltimore, and the Galvano-Faradic Co., of New York, had evinced a disinclination to undertake the necessary experiments because of the expense which would be incurred. His own experiments however, had shown him that the suggestions made in his paper at the last meeting, were in the right direction. If such a coil were constructed and adopted, the results obtained by different investigators would be much more nearly uniform. The speaker proposed that the committee should report progress, and that they be continued for another year.

Dr. W. F. Hutchinson, of Providence, thought this proposition an excellent one. The members of the committee were receiving an astonishing number of inquiries from medical brethren showing a wide-spread ignorance of the subject of electricity, and matters are made still worse by the variability of the instruments at present at our disposal. The coils should be made of a definite length and resistance and the current operating it should have a definite strength.

The President suggested that the services of an electrical expert would facilitate the work of the committee, and added, that he thought it would be well to add the name of Mr. A. E. Kennelly to the committee. Suggestion approved.

Dr. G. Betton Massey, of Philadelphia, said that he had especially directed his attention to a consideration of the powers of the primary faradic current to contract muscle. In the course of his experiments, he had found that an Engelman faradic battery when tested on a very muscular myoma failed to produce the same amount of contraction which resulted when currents from other primary coils were tried. Four du Bois-Reymond coils in his possession act very differently, and these differences he thought were due to variations in the length of the primary wire, in the mass and length of the core, and in the character of the current interruptions.

The President said that there need be no surprise at the difficulty the committee found in pursuing their investigations, when one remembers that induction coils may be made varying from less than twenty vibrations per second, to one giving alternations of 20,000 per second, and producing a current, which, so far as is known, has no effect on the human system.

On motion of Dr. Hutchinson, the name of Mr. Kennelly was added to the committee.

Committee on Meters.

As none of the members were present, there was no report.

The Committee of Arrangements announced that the Association had received an invitation from the Electric Club to a reception given that evening in their honor, also an invitation to visit and inspect the Telephone Exchange.

THE USE AND ABUSE OE ELECTRICITY IN MEDICINE.

By A. D. Rockwell, A. M., M.D., of New York, formerly Professor of Electro-therapeutics in the New York Post-Graduate Medical School and Hospital, etc.

Anything that is used, can be abused. What we eat and drink and the air we breathe, are common and ever present examples of the folly and ignorance of man in the use of the good things of life, and in every direction the tendency is to abuse rather than to rightly use the gifts of nature. Activity without insight is the law that governs, and the result is that evolution of correct principles becomes handicapped in unnumbered ways. Now while this applies to many departments of our art, as well as to other fields of investigation, it applies with especial force to the study and practice of electricity in medicine. Devolution or destruction accompanies and is a part of the general process of evolution, and it is a significant fact that this reverse process of devolution which should by this time have exhausted its ill directed energy is more active than at any previous time in degrading a field of research as fascinating and important as any in the whole range of medicine.

Now this clog or hindrance to the right appreciation and the right use of electricity does not eminate so much from self-confessed charlatans. With the advance of a better knowledge of the subject, the emoluments of their trade have been so curtailed, that with the advertising oculists and throat doctors of a quarter of a century ago, they form an insignificant and almost unrecognized factor in the line of this special work.

Neither do I allude to those members of the profession who, making no use of electricity themselves, honestly believe it to be of little practical value and discountenance its employment.

My remarks are suggested in remembrance of a far larger body—members of the regular profession who freely use electricity, and of a still larger number of the laity who either with or without advice make use of this agent as commonly and as confidently as they take their morning bath or daily friction.

I would here make one emphatic disclaimer, for when one advocates certain restrictions in the use of measures in which he himself is especially interested, he lays himself open to the charge of being a special pleader actuated by unworthy motives. I am far from believing that only those can use electricity with satisfaction to themselves or benefit their patients who have devoted years to its study and to the practical details of its application. I am sure that no physician is thoroughly equipped, who has not in his profession and always in perfect order, some form of electrical apparatus.

While engaged in the preparation of this paper I read in the daily press of a fatal case of opium poisoning. Four physicians gather at the house and recognize that the only hope of saving the patient, is the prompt and persistent application of electricity. Eager and prolonged search finally results in unearthing at a neighboring druggist's an old apparatus, which on trial proves inefficient, and the patient dies.

Possibly a life might have been saved had the proper appliance been at hand, with a knowledge of the necessary simple details of its application in such cases, for we all know that by the use of this powerful agent, artificial respiration can be continued for hours, until the paralyzing effects of the poison wears away.

Neither do I believe that in every case and on all occasions it is necessary that all applications be made by the physician, although I am confident that every medical man who has had experience in this direction, will agree that such self-treatment is usually unscientific and unsatisfactory and in many cases utterly impracticable.

The temptation on the part of the people to use electricity themselves, and on the part of the profession to allow them to do so, is very strong. The majority of physicians know little more of electro-therapeutics than their patients. Forgetting that it is not so much electricity that cures disease as the method of its employment, forgetting that there are various kinds of electricity in common use and many different methods of applications, every one of which is capable of various modification, forgetting that there are certain temperaments who do not bear electricity well, and upon whom the currents and methods employed must be studi-

ously varied during a course of treatment, in short, forgetting that electro-therapeutics considered as a science or an art is wonderfully complex and exacting, orders the patient to get a battery and try electricity. Now, to hold at this stage of its development such mean ideas of electro-therapeutic science is unworthy any intelligent mind and it should be the aim of the members of this Association to counteract such erroneous teachings. This is the more necessary because from its very nature electricity in its therapeutic relations is far more readily misunderstood than understood and abused than rightly used.

Any one can buy a battery of some sort, for the market is glutted with machines of the most inexpensive and worthless construction. Any one can readily learn to put it in action and apply the electrodes, and when this is done whether by physician or patient, it is too often with the understanding that what has been done is all there is to electricify. No matter how generally well equipped for his work every medical man acknowledges the necessity of preliminary training and an acquired experience before he can claim expertness in operative surgery, or in the various special departments of medicine, but in electro-therapeutics, not only the otherwise well educated physician bnt the veriest fool considers himself competent as soon as he has mastered the mechanical details of such ordinary induction coil or galvanic apparatus as may happen to be in his possesion. Such assumption is the heighth of injustice both to the reputation and to the scientific development of the agent, and to the patient who has been deceived. The fault of the physician lies not in the use of electricity, even though he be no expert, but in the claim of a degree of knowledge and expertness that he does not possess. Precept should teach by example, and as a picture of genuine and frequent experience I have in mind two cases of infantile paralysis. In both of these cases there existed but the slightest evidence of muscular irritability, and the previous history and course of both were almost identical. The first of these cases was subjected to prolonged applications of the galvanic current with frequent interruptions, sufficiently strong to call forth the slight reactions that it was possible to obtain. The result was that muscular irritability became entirely extinguished, the limbs that might under judicious methods have regained a certain power of locomotion became hopelessly paralyzed. Here then we have evidence that sudden galvanic shocks, whatever useful purpose they may sometimes serve, are often dangerous in the extreme. Their effects are in the main undue stimulation, and in their relation to nutrition, destructive, rather than reconstructive.

The continuous passage of the current on the contrary, while in a certain sense stimulating in its effects, combines influences that are sedative and tonic, and preëminently reconstructive, and is alone equal to the task of resisting progressive degenerative changes in nerve and muscle.

The second case, treated patiently by the continuous action of the current, without any frequent attempt at first at muscular contractions pursued an entirely different course.

Very gradually, the muscular contractions became stronger and stronger the limbs warmer and larger, until finally the patient regained a considerable and permanent control over the paralyzed members. I here present to you a patient who is an excellent example, on the one hand, of misdirected energy, that activity without insight to which I have alluded—and on the other, of the benefit to be derived by a method which for the want of a better name I have termed, the cumulative effects of electricity. Last November he was caught by a slowly moving engine, dragged along the ties, and sustained fractures of the clavicle, humerus and several ribs. Traumatic paralysis of the radial, median and ulnar nerve supervened, with complete motor and partial sensory paralysis of the right forearm and hand and in a less degree, of the arm and shoulder. He was for three months treated electrically by his attending physician who used the faradic current only, having the patient hold the electrodes in his hands. On one occasion he went away and forgot all about the patient and allowed a strong current to pass for nearly an hour. The paralysis failed to improve under such barbarous treatment, and when he fell under my observation in May last, there was such a profound atrophy and loss of muscular irritability, associated with degenerative reactions, that I gave a discouraging prognosis. You observe however, the very excellent results of the method adopted. He at once began to improve and improved rapidly, and is now able to engage in manual labor with almost as much efficiency as ever. The increased efficiency of the galvanic current when it is applied for some time along the course of a nerve without interruption as was done in this case is a most interest phenomenon. Energy is undoubtedly stored, possibly in the same sense, although not in the same demonstrable way that chemical action is stored in the ordinary storage batteries. The result is seen not only in increased power in deflecting the needle of the galvanometer, but in overcoming conditions of disease. One factor accounting for this increase as must be quite evident, is the better conductivity of the tissues gradually taking place at the seat of the recomposition of the current—a result due to congestion of the skin and adjacent parts under the electrodes. That this explanation however of the increasing strength of the current when continuously passed through living tissue is but partial, can readily be demonstrated.

I apply the current from a given number of elements to the arm and forearm, and seven milliampères are immediately registered. In two minutes there is an increase of one degree, in two minutes more an additional degree, and in eight minutes twelve milliampères are registered. That this extraordinary increase in strength is not caused by improved conduction simply, I soon satisfy myself by applying vigorous friction to the other arm, and when the congestion is as intense as that produced by the electricity, the electrodes are applied. Instead of seven, the meter does indeed immediately register ten milliampères, but it is not until several more minutes have elapsed that the additional two degrees are registered.

To analyze the molecular disturbances that evidently take place during the passage of the galvanic current is a labor of the greatest difficulty, and the phenomenon is not yet thoroughly understood.

Evidences, however, of the chemical action of electricity as it passes through the tissues are not wanting, and the sudden increase of strength is perhaps due to the electrolytic or polarizing action of the current, exciting a secondary current in the living body, similar to what is observed ia a reservoir or secondary pile.

It would perhaps be too much to assert, that any intelligent physician using electricity is unacquainted with the fact that there are three main divisions of the subject, namely: the static, galvanic and faradic forms of electricity, although it is certainly true that the majority have very little appreciation of the wide difference in their physical, physiological and therapeutical effects. How many, however, are aware that the induction coil itself is so differently and variously constructed as to yield qualities of current that for all practical purposes are as separate and distinct as are the galvanic, faradic or static forms of electricity?

And of the number who have knowledge of these facts of physics, how few there are who have given any adequate

consideration to the differential indications for their use.

To correctly differentiate between the various manifestations of electrical energy and then to decide upon the proper method of its administration, are questions of the highest importance and their solution beset with difficulties, and place electro-therapeutics in the front rank of scientific studies. Polar effects and current directions are again two factors in the production of therapeutic results that demand more careful investigation. No one would now assert that in gynecology or in electro-surgery it was a matter of indifference which pole was used, but it is not uncommon to hear the expressed opinion, that in medicine it makes but little difference which pole is used or which direction of the current. In the midst of the theories more or less fanciful that have accompanied the magnificent discoveries of Galvani and Volta, Mattenci was able to bring forward evidence of the chemical action of the current on organized tissue. His doctrine, though thoroughly scientific and based on experimental facts, had to make way for the classical yet confused hypothesis of the Germans—the theory of electrotonos—a mere physiological theory having no relation to anatomy or histology. Two of the most celebrated disciples of Du Bois Reymond, the author of the classical physiological theory of electrotonos, Erb and Eulenbourg, had long experimented according to his ideas, in cities far apart.

Starting from identical principles, the result of their long years of study proved to be absolutely contradictory. This was rather embarrassing to the sanction of the theory. Looking for an intermediary capable of explaining the discord they referred the matter to Helmholtz, who explained the difference by showing that if you apply the negative pole at any point whatever there will result at this point an increase of excitability, but that for reasons of a purely physical order, there can be in the vicinity of the negative pole a positive point. If therefore you excite a nerve near its catelectrotonic point, you may chance to light on an anelectrotonic zone—a circumstance that fully explains how it became possible for two experimentors starting from the same premises to arrive at different results. It is quite certain that in indicating the formation of a zone with an opposite name around the excited point, Helmholtz, as did Matttenci, had in mind the chemical effects of the current, but in accepting his theory his countrymen have transformed a physiological action based upon electrolytic changes into phenomena the explanations for which were fanciful and unscientific.

I call attention to these old facts of history in order to emphasize the strong physiological and chemical basis for the study of differential polar effects in therapeutics. My own more recent investigations along this line greatly strengthen me in the belief that there are still richer veins to be worked in electro-therapeutics than have even yet engaged our attention. There can be no question as to the physiological significance of the complete elimination of one or the other pole in direct experimental tests, and clinical results, as I have had occasion to observe, are in more or less accord with the results of physiological experiment. Much fault is found with electricity, or rather with those who advocate its use, because so much is claimed for it. These claims are, however, based upon the demonstrated fact that it is a many-sided weapon. It acts efficiently in diametrically different conditions, and prejudice is often excited against its use because of the seemingly paradoxical claims of those who write about it. But the fact has been so thoroughly established that it is both a stimulant and a sedative, a tonic and depressor, or a violent irritant, according to the kind and quality of the current used and the method of its application, that those who oppose its use on the ground of these paradoxical claims simply declare their own lack of practical experience.

In its relations to the arts and in its purely commercial application, electricity affords but little opportunity for the charlatan. In order to obtain an honorable recognition the electrical engineer must in reality be an expert. No incomplete and imperfect knowledge will serve his purpose. With the medical electrician, however, it is far different. He may be utterly ignorant of the simplest problems of physics and entirely at sea in regard to the important subject of current differentiation, and yet unblushingly palm himself off on a credulous public as an expert in electro-therapy. He may indeed be utterly ignorant of medicine itself and yet gravely call himself a medical electrician, while those upon whom he practices his crude and ill-digested art, and who in other things count themselves as wise, fail to see the incongruity between his equipments and pretensions.

Discussion.

In answer to a question from Dr. Massey, the author said that it was difficult to obtain any reaction whatever, although the reaction of degeneration was present, and the arm was greatly atrophied. One object of his paper was to demonstrate that electricity is capable of affecting degenerated fibres, and enough time had elapsed in this case before beginning the electrical treatment, for spontaneous regeneration to have occurred.

Dr. R. J. Nunn said it was absolutely impossible, in a sparsely populated district, for the medical practitioner to have all the most approved electrical appliances always at hand, and it was not so much his fault, as that of his surroundings. These country practitioners are the bone and sinew of the profession. Regarding the tolerance of patients to electricity, he said that he had sent a patient to Dr. Morton who developed albuminuria whenever a mild galvanic, faradic or static current was applied to him. The albuminuria was also produced by nervous excitement, over-fatigue or indigestion.

The President thought this peculiar effect of electricity was rather fortunate, as it gave objective evidence of the effect of this agent on metabolic processes going on in the human body. One should not lose sight of the very important point made in the paper concerning the chemical action of the current.

In answer to a question whether the *shock* of the treatment might not be responsible for the albuminuria, he said that as the patient was used to electrical applications, and the albuminuria followed the application of the quiet continuous current which should not cause any nervous excitement, it seemed evident that the occurrence of the albuminuria could only be explained by considering it a direct result of the irritating action of the current.

NEW CONTRIBUTIONS OF THE ELECTRICAL TREATMENT (BOTH FARADIC AND GALVANIC) TO THE DIAGNOSIS IN GYNECOLOGY.

In the absence of the author, the paper of G. Apostoli, M.D., was read by Dr. Hutchinson.

If the operative techinque and surgery have almost arrived at their apogee in gynecology, having since the discovery of antiseptic methods, pursued a most brilliant and successful career, on the other hand it may be affirmed that the knowledge of the indications for operative interference based upon a diagnosis of the condition of the uterine appendages which is of predominating importance, is far from having made the same advance.

In consequence, uncertainty still reigns and a surprise is the rule in exploratory laparotomy.

It is unnecessary to insist upon the interest which attaches itself to a new method of exploration, destined by

its precision and the facility of its exploration to save many mistakes, to show the road, as it were, without the bistoury, thus avoiding irreparable if not fatal errors—destined, we may say, to disarm the surgeon or to counsel an advance after furnishing a sure and exact guide.

If conservative gynecology has indeed found its best and most precious auxilliary in electricity, surgery in its turn is rapidly destined to claim frequently its aid to light the way, to confirm or rectify a doubtful diagnosis, to impose or hasten an operation when at first sight it did not seem to be required or to proscribe it in others as being superfluous, useless or dangerous.

Two vital questions most difficult to solve present themselves every day in gynecology. Are the appendages diseased? If so, is there pus, or what is the degree of their inflammation.

It is to solve these questions that laparotomies called exploratory are made daily or castrations are done not authorized by the actual inflammatory condition, and it is for the solution of these problems that I propose to employ the aid of a *preliminary electrical treatment.*

Indeed exploratory laparotomies and mutilating operations practiced at the commencement for rebellious ovarian pain or for ovarian disease of a doubtful nature should be proscribed until the resources of *faradic sedation* and of the intra-uternial *galvanic reaction* have been exhausted in the diagnosis, I affirm that intra-uterine applications, faradic or galvanic, if questioned with sagacity and perseverance are destined with the greatest frequency to clear up the diagnosis in the following clinical conditions which may be condensed in these formula.

A.—Faradic Current. In 1883 I extended the road so largely opened by my friend and master, Dr. Tripier and demonstrated what might be gained in gynecology from the faradic current of high tension if administered *during a sufficiently long period*; I showed also that the faradic current of high tension (produced by a long fine wire) is a marvelous *sedative*, a calmer of pain in general and that it was of great utility in the treatment of the so called ovarian pains of *hysterical* origin which plays frequently so large a part in uterine pathology.

The therapeutic response given by the faradic current applied according to the rules which I formulated in 1883 are clear, precise and almost constant. It suppresses or at least diminishes or interrupts for a period varying from several hours to several weeks every hysterical ovarian pain, if it be hysterical only in its origin.

It acts sometimes so instaneously that one might suppose it the result of a powerful and irresistable suggestion—it brings relief with such facility in the painful ovarian zone —with the more certainty if applied to the interior of the uterus than in the vagina—that armed with these facts I have utilized the method as a means of *diagnosis.* If every hysterical ovarian pain, most frequently unilateral, and *without inflammatory lesion of the appendages* is almost always appeased for a longer or shorter time by the faradic current and every failure of this medication must be attributed to a sub-stratum of inflammation producing a more or less serious irritation of the appendages not amenable to the sedative influence of the induced current. Now, such is the exact clinical fact as an experience of more than ten years has made perfectly evident to me and I am enabled to-day to formulate in several general propositions the rules and practical conclusions which guide me.

Every ovarian pain of hysterical origin is amenable to the faradic current of high tension.

Every failure of this medication is due almost always to a concomitant inflammation of the appendages.

Given an ovarian pain of doubtful origin it is necessary first to faradize the uterus, either the pain will disappear for the moment or it will not be influenced at all; in the first case it is of hysterical origin, and in the second, it is an unrecognized affection of the appendages which will require a complementary examination or a special procedure.

So if a woman consults us for an ovarian pain and a bimanual examination reveals no evident lesion of the appendages, it is necessary first, to faradize the uterus and if there is no relief it may be necessary perhaps, under chloroform, to make another examination.

If doubt remains the application of the galvanic current will render evident what the faradic only caused to be suspected.

En resume. The faradic current of high tension instructs us as to the true nature of the ovarian pain, so called, of which it is the most rapid and efficacious calmer.

Ovarian pain is indeed most frequently amenable to the faradic current of high tension if the rules of procedure are followed as regards the number of applications, their duration, choice of coils and seat of application which I formulated in 1883.

If *hysterical, and hysterical only*, it is, if not cured, almost always relieved, while on the other hand if of inflammatory origin, notably if allied to an inflammation of the appendages, the application of the faradic current of high tension is unsuccessful in almost every case, so then if in a particular case the *successful cure* enlightens us as regards the diagnosis and imposes an abstraction from operative procedures, in another the failure shows that the pain is of deeper origin, which requires a supplementary galvanic treatment or an operation.

B.—Galvanic Current. Since I proposed in 1882 for divers gynecological affections (fibrous tumors, endometritis, peri-uterine inflammations, functional troubles, amenorrhœa, dysmenœrrhœa, menorrhagia, metrorrhagia, etc.) a galvanic treatment uniform in appearance but differing essentially as regards intensity, duration, localization, number and interval of applications, choice of poles, etc., I have been struck with two facts of the greatest importance.

1. *The variable tolerance of the uterus in different subjects for the same dose of galvanic current.*

2. *The variation of this tolerance in the same uterus according to different peripheral anatomical condition.*

These facts at first empirical and confused in my mind only found their explanation when I placed the uterus in subjection to the innervation of the ovaries and tubes and when I had observed that the sensibility of the uterus was above all dependant upon that of the appendages.

The variations in sensibility in different subjects and in the same subject at different times according to the morbid or other condition of the appendages became perfectly clear. The law of salpingian and ovarian reflexes which controls this important problem was not long in receiving at my hands an experimental solution which was equal to a mathematical demonstation.

If it is really true that in a particular case, a woman suffers and is intolerant of the galvanic treatment because the appendages are inflamed, it is necessary only to suppress these organs to reestablish at once a condition of freedom from pain and to restore the equilibrium of uterine sensibility, in order to prove on the other hand that the uterine hyperæsthesia was indeed provoked by the morbid state of the appendages, it is sufficient to apply the electrical current under exactly the *same operative circumstances* after castration as it was applied before the operation.

The electrical tolerance should be acquired immediately by a uterus which before castration will not support it at

all or very badly. Such is the case and it constitutes the experimental proof of my clinical induction.

I have at present many examples of women whom I have vainly endeavored to treat by the intra-uterine galvanic current which powerless to produce the least benefit only served to indicate the necessity for castration.

This operation having been performed, immediately the excessive uterine sensibility has been appeased and I have been able, after this bilateral operation, after the abolition of the injurious reflexes, to bring to a successful termination an electrical treatment which before was not only intolerable but powerless and inefficacious. Thus the castration liberated the uterus from its galvanic hyperæsthesia and restored a tolerance almost identical with that conferred by the physiological integrity of the appendages.

I have thus been able at one stroke by the same therapeutical measure well directed, to clear up the diagnosis, legitimize a surgical intervention, and to complete later a symptomatic cure which the knife could not accomplish.

It is then perfectly true that the condition of the appendages regulates before everything else and almost entirely the question of intra-uterine galvanic tolerance and it is in this connection that I propose to paraphrase a well known proverb and say:

Tell me what the galvanic uterine reaction is with this or that woman and I will tell you the condition of her appendages.

This formula comprises in itself the new and important problem which I will briefly explain and develop. Since 1884, I have grouped under several heads the causes of this uterine intolerance.

1. *Hysteria.*
2. *Intestinal Inflammation.*
3. Peri-uterine phlegmasies (this word at first somewhat vague, expressing only a general formula, soon took a more concrete form and the expression, lesions of the appendages, has been substituted.)
4. *Certain fibro cystic tumors of the uterus.*

In every intra-uterine galvanic application there are two points to note.

The Operative reaction which comprises the manner in which the current is supported and tolerated by the patient during the application.

The post-operative reaction (which is the most important of the two) comprising all the sensations experienced by the patient the same day and the following ones.

This reaction may be of a *painful character* or simply *nervous* (a bending over, fatigue, colic, pains in the kidneys, etc, which may be prolonged one or several days perhaps obliging the patient to remain in bed.

This being said we will now examine the general clinical replies to our interrogations with the galvanic current.

a. Every intra-uterine galvanization of from 100 to 150 m. a. in a uterus simply hypertrophied or fibrous, with or without a concomitant endometritis, without an associated inflammatory lesion of the appendages or of the pelvis—every such galvanization I say, applied with all antiseptic precautions, is always absolutely harmless, almost always well supported and is never followed by a post-operative reaction febrile or very painful the next or the following days if care has been taken to respect the individual susceptibility or tolerance, although rarely however during the application there may be an intolerance which forbids and limits a dosage beyond the medium, but it is purely hysterical.

In this case if there is much pain during the application, it is rare that it does not cease at once when the séance is finished or does not rapidly subside.

In such a case I repeat the intolerance is of a purely hysterical character and the diagnosis becomes surer if we observe an extremely painful reaction on one hand, and its rapid subsidence at the termination of the application on the other, without any consecutive febrile reaction.

In a word, the more a woman complains during the application, the more brusquely and out of proportion to the dose, the resulting reaction—the more generally the pain ceases when the current ceases to pass, the more precise the diagnosis of hysteria.

Having examined the first case we will now turn to the second.

b. On the contrary, in every case of peri-uterine phlegmasia the electrical intolerance during the application and above all the post-operative reaction begins, increases and is prolonged in proportion to the activity of the said inflammation of the appendages (ovaries or tubes). At this point I will stop to answer a perfectly natural objection to the procedure.

Is every intra-uterine galvanic application dangerous in the presence of an ovarian cyst or suppurating inflammation of the appendages?

Yes, if the application is too intense or badly administered.

No, if it is moderate and well conducted.

Yes, if the application is brutal, massive, particularly if the intra-uterine negative pole, and at the beginning of the treatment; *no*, if progressive, always tolerable, and if the positive pole is used at the commencement.

In conclusion, if when a question of pure hysteria the dose is not of great importance except that it is unnecessary to irritate the patient and turn her away from a salutary medication, in the other case, the greatest reserve is imposed as regards the dose, for it is the safeguard of its inocuity and of its efficacy.

The question must, however, be considered somewhat in detail:

Every cyst of the ovary pure and simple, that is to say without suppuration and without concomitant lesion and inflammation of the tube or appendages opposite, can tolerate safely high intensities applied intra-uterine.

I have observed this quite a number of times in patients when I have applied the current through an error in diagnosis and no accident has resulted, not the shadow of a post-operative reaction of an inflammatory character.

These patients were operated upon afterwards with success and non inflammatory ovarian cysts discovered with normal tubes.

These facts prove abundantly that to have exaggeration of the uterine reflexes above all there must be an *active* inflammatory process going on in the appendages for we find as a second clinical reply that:

Every pelvic suppuration, particularly acute inflammation of the appendages (ovaries or tubes) predispose to intense post-operative galvanic reactions.

Yes indeed, that the post-operative reaction which is proportioned to the *suppurating* inflammation of the appendages may cause accidents, it is necessary to have the courage to avow and to proclaim it openly in order to understand the reserve, the circumspection necessary to avoid accidents.

But is this any reason why we should disarm ourselves and renounce the employment of a remedy of incontestible utility?

Yes, if we have not the most certain means to defend ourselves, if we have not a true touch-stone to shield us from our possible ignorance.

No, if we have a sure and positive method of control, if mathematical precision. to shield us from the mistakes we are liable to commit.

This control is first of all *preventive* and inculcates in

doubtful cases the greatest moderation, feeling the way I should say, in the application and number of the first séances.

The general rules of conduct are the following:

a. Begin every galvanic application with the positive pole in the uterus.

b. Never apply on the first occasion more than 50 ma. and never at the commencement go beyond the dose which will be supported by the uterus.

c. Make the first galvanizatian with the greatest circumspection and without brusqueness.

d. Interrupt the application as soon as there is manifest intolerance and renew it only after two or three days when all post-operative reaction has subsided.

e. Do not augment ulteriorly the intensity and duration of the application except in proportion to the toleranec manifested upon the preceeding occasions.

These precepts are to be well comprehended and faithfully observed whether the remedy is tolerated or not.

If it is well tolerated, we have the signal which indicates that the road is open and we have to advance without fear or hesitation because the uterine periphery is healthy and the appendages in good condition, or at least they are not in a state of actual inflammation or suppuration.

If there has been previous inflammation (which is posible) it is for the moment extinguished which happens in those old exudations which are the posthumous witnesses of an anterior acute inflammation which has totally disappeared. In a word we find ourselves with a patient absolutely amenable to *conservative treatment* where we *can* and *should* try every means of saving the appendages with the chances greatly in our favor.

Every faculty of the practitioner should be employed to adapt to the case, the pole, the dose, and the numper of applications. If on the other hand, the intra-uterine galvanic cauterization is not tolerated in spite of the precautions recommended, if in a word an intense post-operative reaction ensues although the séance was carefully conducted, we have in this fact if well interpreted a true *thread of Ariadne* which will serve to lead us to the true diagnosis.

Every circumstance becomes of importance and serves as a most precious means of control. The fever after—the pain which continues the next and the following days—the loss of appetite, the insomnia, principally the absence of all amelioration and the aggravation of the previous state serve as important guides.

If the post-operative reaction is intense and prolonged it is a cry of "halt!" a red disk which indicates that the way is barred and advance impossible.

So at times we may extract good out of evil; it is the danger avoided while suspected and foreseen which serves as a touch stone to clear up and fix the diagnosis saying plainly:

Here the appendages are suppurating; there they are not.

Here a catarrhal salpingitis which is curable; there a suppurating inflammation of the tubes and ovary. Here an operation is required at once; there it would be a crime to do it.

Here an ovaro-salpingitis amenable to patient, laborious and progressive conservative measures; there a serious inflammation to be treated only by castration or vaginal hysterectomy.

It can be seen then readily how, from the very fundamental principles of this intra-uterine therapeutic method, the surgeon can and will in the future find indications of the highest importance which will enable him to make in advance and *not á posteriori* a correct diagnosis, which will arm or disarm him accordingly.

How vast and important this problem is and how worthy to occupy the attention of surgeons, who are often obliged to open the abdomen to make a diagnosis; who perform inconsiderate mutilations or operate for supposed fibroid tumors when really it is salpingitis or ovarian cysts, or *vice versa*.

To epitomize what I have said: The galvanic current applied to the interior of the uterus is destined to inform us respecting the state of the appendages—if healthy; if inflamed, the degree of inflammation; if pus exists; if the disease is curable or not; if there is an inflammatory process in course of evolution.

It is capable of saving us from many clinical and operative mistakes and of enabling us to avoid, for one example among many, the error of mistaking a *subperitoneal fibroid tumor* for a *salpingitis*, and *vice versa*.

Two facts of the greatest importance dominate all galvanic intra-uterine therapeutics:

First, the *absolute tolerance* (with the exceptions I have noted).

Secondly, the *intolerance* which increases with the acuteness of the inflammation of the appendages.

The uterine sensibility is then in perfect subordination and relation to that of the *appendages*, and the reply we get from the application of the current will enlighten us upon the absence, or degree of inflammation of the appendages.

Beyond this first, most frequent and most important source of intolerance, there are others of secondary importance between which it is usually easy to make a differential diagnosis.

a. First in importance comes frank *hysteria* with its sudden, intense reactions, and general appearance which cannot fail to strike the most unobservant.

b. Fibro-cystic tumors of the uterus, very probably of a malignant nature.

c. Phlegmasias of the pelvis comprising the *intestines*, which have a well-marked and characteristic history.

The clinical consequences which ensue from these premises, briefly stated, are the following:

1. A uterus tested by the galvanic current with a dose of from 100 to 150 ma. which gives no operative reaction, which not only tolerates this dose but results in a dimiuution of the dominant symptoms (such as pain and hæmorrhage); a uterus, I repeat, thus tolerant has always its periphery healthy, or at least there is not actual inflammation of the appendages requiring surgical procedures, but the galvanic treatment, of which the dose is limited only by the clinical indications to be carried out.

Even if there be a coexistent *ovarian cyst* without inflammation of the tubes, the same electrical tolerance will be preserved.

2. A uterus which supports only 50 ma. or supports it badly, where the consequences are much pain and fever, has a *suspicious periphery* and should be tested with moderation and prudence.

3. A uterus whose intolerance diminishes with the number of applications and is accompanied with marked and increasing attenuation of the symptoms, is that of a hysterical subject, or there is an inflammatory process in the course of regression or arrest.

4. A uterus whose intolerance at the commencement is excessive (supporting only 20 or 30 ma.), and which increases with the number of applications and is accompanied by an elevation of temperature, is a uterus whose periphery is attacked by a lesion not amenable to conservative gynecology. In this case a suspension of the galvanic treatment is imperative when the diagnosis is thus elucidated, and it becomes necessary to employ surgical measures—most frequently it will be a castration justified by the presence of an ordinary suppurating ovaro-salpingitis.

Discussion.

Dr. Massey said this seemed to him the most important paper ever written by Apostoli, and he could, from his own experience, endorse the views expressed in it. The surgeons could find in this new aid to diagnosis an additional help in enabling them to avoid performing many useless operations. In his opinion, the author had drawn the line rather too sharply in regard to the avoidance of electricity where the use of this agent elicits certain painful responses, and in this connection he wished to say that the idea of thrusting a perfectly rigid instrument like Apostoli's electrode into the uterus under all circumstances, was to him simply horrible. He was convinced that moderate inflammation did not contra-indicate very careful applications to the interior of the uterus, but the presence of pus in a tube, without free exit, is a positive contra-indication, as is also the presence of any phlegmonous inflammation which has reached the stage of suppuration. Where the os is at all patulous, and it usually is when there is an inflammatory condition about the uterus, we should use a flexible electrode, with the point protected by a globule of shellac or hard rubber. It may be covered like an applicator with absorbent cotton, moistened with hot water or with a solution of cocaine. In cases of suspected inflammation of the appendages, and with undoubted enlargement and softening of the uterus, he had noticed that where this plan had been adopted, the treatment had been followed by less pain. He was convinced that all ovarian and salpingitic cases are originally uterine, and the question to determine is whether the case is more uterine than ovarian, and this will usually be settled by the treatment.

Dr. Goelet had utilized the faradic current in the vagina by the bi-polar method to facilitate diagnosis, but had hesitated to use it in the uterus in the manner described by Apostoli, because he had found that such cases were at first rather intolerant of intra-uterine interference because of the coexisting endometritis. Treatment of the endometritis, however, which in many instances is responsible for the continuance of the inflammation in the tubes, will so far relieve the undue sensitiveness as to admit of such treatment even in cases which were previously supposed not to be amenable to this treatment. He thought harm would surely result from an indiscriminate practice of this test for diagnostic purposes. The gynecologist is the best qualified to conduct this treatment. It must not be forgotten that what Apostoli might do with impunity, many others, even gynecologists, should hesitate to undertake, for Apostoli has reached a rare state of proficiency in manipulation. He did not approve of condemning every case of uterine intolerance to operative interference, nor did he think Apostoli intended to convey such an impression, for in another portion of the paper, he said that many of these cases can be better treated by electricity than by cutting operations. Endometritis is responsible for the uterine intolerance, and after relieving this, electrical treatment can be resumed with benefit. The so-called Apostoli bipolar intra-uterine electrode as ordinarily made in this country, is an abominable instrument, as it would in many instances require previous dilatation of the canal to allow its introduction, but Apostoli's original instrument is quite flexible and not much larger than an ordinary intra-uterine sound. The platinum electrode, though rigid, can be introduced as readily as the uterine sound if one possesses ordinary skill in manipulation.

Dr. Nunn thought that any high tension current, as for instance the static current, could be used as well as the faradic for the relief of pain. The difficulties in diagnosis in some of these cases are very great. He recalled one case which had been for three years under treatment by an accomplished surgeon for what was supposed to be an ovarian tumor. There was certainly a tumor on the right side, but the faradic current showed the tumor to be entirely hysterical, and it eventually disappeared. The intolerance which she at first exhibited disappeared after considerable perseverance in the treatment. He might have been particularly fortunate, but he was bound to say that in his hands, inflammation had never followed from the introduction of an electrode. He had been much pleased with the tin electrodes suggested by Dr. Goelet. He preferred to select a small one, and cover it with absorbent cotton until it is of the desired size. Intolerance to electrical treatment had been considered to be dependent upon inflammatory conditions, but the speaker was inclined to attribute it more to idiosyncrasy, and he cited two cases to illustrate this point. One of these patients rarely could stand fifty milliampères, while the other usually takes one hundred milliampères without discomfort.

Dr. Rockwell said that before the practice of using high tension currents from very fine wire coils came into vogue, there had been no doubt in his mind as to the superiority of the galvanic current over the other forms, where it was desired to relieve pain, whether external or internal, but now he found it difficult and sometimes impossible to determine *a priori* which current is more suitable for a given case. He had been accustomed to use the current from a coil containing 2,000 feet of wire, made up of several coils of different sizes of wire, all connected into one continuous coil. The current from this coil had a remarkable analgesic effect, like that described in the paper, and it was therefore of value in relieving pain of a neurotic type, and in excluding organic trouble. A short time ago, a patient with all the symptoms of ulceration of the stomach was referred to him for treatment of an associated gastralgia. A current from a very long coil run by five or six Leclanche coils, relieved him promptly, and the speaker then felt justified in stating to the attending physician that he did not consider there was any organic disease present. The subsequent history of the case confirmed this opinion.

Dr. H. H. Hahn, of Youngstown, O., said that he had frequently noted a striking difference in the effects obtained with various electrodes, and in some cases, any stiff electrode, no matter how well made, will drag the neck of the uterus forward, and pull upon the attachments. Under these circumstances, the patient is often intolerant of the treatment, but this may be diminished by using a flexible electrode. He had devised one with a joint just external to the os, so that after the introduction of the instrument, the uterus will be allowed to resume its usual position before the current is turned on. He had in this way been able to use the current in cases in which Apostoli would not employ it, and by beginning with ten milliampères, and after an extended course of treatment gradually increasing it up to 150 milliampères, he had obtained very excellent results.

Dr. Charles R. Dickson, of Toronto, said that in some of the cases in which the stronger currents were contra-indicated, he had met with success from the use of exceedingly mild galvanvic currents, starting with perhaps only five milliampères for five minutes. He had had cases in which even with very mild currents, a rash was produced, but after a few weeks of cautious treatment. he had found that the current could be very materially increased. He was not accustomed to employ the ampèrage advocated by many.

(To be continued.)

A NEW gynecological operation has been devised by Dr. Duhrsen, of Berlin. Its object is the vaginal fixation of the uterus for the relief of retroversion.

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SATURDAY, JANUARY 21, 1893.

COLLATERAL ORGANIZATIONS.

The recent rapid increase in the number of physicians in this country, accompanied by a corresponding development and progress in our art, has of necessity caused the formation of special societies for the promotion of special lines of professional work. Some of these organizations are naturally collateral and coöperative in their purposes with the American Medical Association. Of these may be named the American Academy of Medicine. The American Medical College Association and the American Medical Temperance Association.

These Societies are each made more successful in their work and purposes by reason of their meetings being held either prior to or during the days of the sessions of the American Medical Association, and at the same place.

Some other Societies would very greatly enhance their own usefulness and prosperity by arranging their place of meeting to correspond with the same place, and either the week before, or after that of the American Medical Association.

In arranging to attend any of the National Society gatherings, everyone desires to obtain all the possible benefits there are to be had during a brief outing. That this may be most perfectly accomplished, a focalizing of societies is necessary. It is to the interest of several hundred physicians and surgeons to have the railway surgeons meet the week after and at the same place with the American Medical Association. At the same time and place the surgeons of the National Guard should hold their annual meeting. It is no exaggeration to say that nine-tenths of the members of these two organizations belong to the American Medical Association. Hence, it is easy to see how desirable it is to them that they may be able to save time and money by such a concentration of meetings as suggested.

The American Microscopical Association is largely composed of physicians, and would add very materially to its working membership by holding its annual session during the week preceding the meeting of the American Medical Association, and at the same place. While mentioning these particular organizations we might refer with equal propriety to others, which would be correspondingly benefitted by holding their meetings at the time and place designated.

In a unification of work and purposes will be found the greatest good to the greatest number.

THE ASSOCIATION OF SOUTHERN MEDICAL COLLEGES.

The editor of the *Southern Practitioner*, a journal edited at Nashville, Tenn., takes exception to our editorial criticism anent the organization of the above named Association. Knowing the history of the attitude of several of the Southern medical schools towards the Association of American Medical Colleges, knowing that twenty-six of these colleges were represented by one or more delegates at the time of the provisional organization of the National body at Nashville four years ago, knowing that a pronounced spirit was manifest by a few of these schools even from the initiative organization, to thwart the establishment of a high grade of requirements, knowing that this disposition was manifest upon the floor of the convention then in session, and that the strongest argument made against any progressive action emanated from a distinguished orator protesting against our attempt to scale the mountain's height by a single leap, knowing that this advanced position upon the part of the delegates was rendered doubtful by a body of delegates representing a few Southern schools immediately convening a caucus in a corner of the same room wherein the National body was holding its convention, knowing that a subsequent caucus was held at the Arlington Hotel, Washington, D. C., immediately antedating the second annual session of the National body in the above named city, knowing that only two of these colleges had severed their connection with the National body and that several were ignoring the provisions of this Association, knowing that the representatives of several of these schools were directly or indirectly trying to destroy the American Association, knowing that gross irregularity existed in regard to the enforcement of even a halfway respectable curricula, by conferring degrees after the study of medicine for a period of "eighteen months" together with attendance upon a few continuous weeks of lectures, or by conferring the degree of M.D. upon the scholarly drug clerk if he will only take "one course of lectures," knowing that the opposition to the adoption of a high standard by the

National Association came from a restricted portion of the South and that the larger portion of the colleges represented in the new Association were these same schools, knowing the above facts at the time of publication of the editorial in question, knowing that the broad-minded, unprejudiced representative of the poorest medical college in America could not conscientiously criticise the tone of the article—knowing these data, we saw fit to manifest the courage of our unbiased convictions by the publication of the editorial in question.

Permit us to suggest parenthetically, that we question the ability of any one journal to prejudice any body of practitioners against the National Assotion unless it is directly to their interests to manifest such spirit. We are of the opinion that the great mass of practitioners of medicine in Kentucky and Tennessee are as desirious of high grade college instruction as the practitioners of Illinois, Minnesota or New York. If the practitioners of Kentucky and Tennessee were to follow the example of their more outspoken brethren in Virginia, North Carolina, Alabama, Minnesota, New York, New Jersey, and several other States they would shortly be equipped against the dangerous product of several low grade colleges in their immediate vicinity. The experience of a large number of States possessing adequate medical legislation reveals the well known fact that a large portion of the alumni of the medical colleges of America, that are conducted "for revenue only" are unfit to be entrusted with the lives of the people. Even though their examinations are far from rigorous over 25 per cent. of their alumni fail to secure a license. Careful statistics gathered by the secretaries of these boards reveal the fact that these men shortly drift out of the profession or locate in States not possessing efficient medical legislation.

Many of these men when too late to retrieve their great loss openly damn their alma mater.

The columns of this journal in the past have been greatly given over to scientific papers and will probably continue to be in the future. Questions of medical sociology have been greatly neglected notwithstanding we are the legitimate organ of nearly one hundred thousand practitioners of medicine in the United States. In view of the repeated and outspoken voice of the American Medical Association in behalf of better medical education we feel justified in assuming the position we do in discussing this question.

IT IS stated that both the Rush Medical College and the College of Physicians and Surgeons of Chicago, have offered to give up their entire property to the Chicago University, and the faculties to resign unconditionally in order that a medical department may be organized on a level with other schools in this already wonderfully well organized institution. It is stated that $1,000,000 is in sight for the endowment of such a medical department.

NATIONAL QUARANTINE LAWS.

We are much surprised at the recent querulous debates in Congress pertaining to the utility, extent and provisions of quarantine laws that are required for the protection of our Nation from such infectious diseases as may be prevalent in other countries.

There has been a unanimous expression of opinion by the medical profession as voiced in the medical press, as to the pertinence and necessity of the National Government assuming absolute control of quarantine measures along the Nation's boundary lines.

This is essential because the questions of control of immigation and imports are wholly within the province of Congress and not of State legislatures. The peculiar rights of the several States are always subservient to measures taken which have a purpose of the greatest good to the people of the whole Union.

The captious disagreements of members of Congress in regard to the formulation of needed laws is a bold illustration of the usefulness to the government of a Cabinet Officer of Public Health.

This official would be the legitimate advisor of the President and of Congress, when all such questions arise for action.

It is quite inappropriate and preposterous to place quarantine measures in the hands of the Secretary of the Treasury, an official whose functions are those of the Nation's banker and credit man. Nor would it be more proper to pass sanitary affairs over to any of the other secretaries for their control.

The men who are familiar with the laws of disease, their prevention and treatment, are the Nation's conservators of health. What do Senators CHANDLER, HARRIS, or SHERMAN, or any other of the members of that august and honorable body—the United States Senate, know of the laws of contagious diseases. What do the Secretaries of the Treasury, the Navy or the Attorney General know of the science of bacteriology and its relation to epidemic diseases? Echo answers—nothing. Nor are they supposed to be versed in such a knowledge. Hence, their action, whatever it may be, must either be of the flaring shotgun order, or depend upon the advice of members of the medical profession.

More eminent sanitarians than those selected by the New York Chamber of Commerce to advise upon the enactment of National Sanitary laws, do not live, move and have their being on our planet, and yet we see Congress paying little or no heed whatever to their recommendations.

A year and a half ago the American Medical Association, the largest representative body of physicians in this country, unanimously passed a resolution requesting Congress to enact a law creating a Cabinet Officer of Public Health, and appointed a committee to formally present, and represent the purpose of

the resolution to Congress. This action of the American Medical Association was endorsed by nearly every State Medical Society from California to Maine.

We regret to say that Congress has been heedless of the resolution.

Never before were such vast health and financial interests at stake, and we see them faced by our Nation's legislators in a way that is puerile in the extreme.

It is not the function or the province of the medical profession to volunteer an expression of opinion in regard to the armament of the Nation's forts or ships, the construction of Government buildings, the disposal of public lands, the enforcement of the Monroe doctrine, the legality of the Inter-State commerce laws, the distribution of seeds, or regulate rates of postage, but because of their special knowledge and information pertaining to conditions of health, of disease and its consequences, they are the accepted and only reliable advisors of the people and their representative law-makers on all quarantine, sanitary and hygienic subjects.

A refusal to recognize the value of such advice, is an indication of egotistic ignorance that is likely to result most disastrously to the welfare of the whole Nation, and at a time when we are most desirous of placing our best foot foremost in the eyes of the Nations of the earth.

It may be that the ignoring of the reasonable suggestions of the medical profession, had a little something to do with the change of political power brought about and determined upon by the people at the recent election. The votes of one hundred thousand educated physicians, evenly distributed throughout the States, besides those influenced by them, is a factor that the most astute politician may not hereafter ignore with sublime indifference.

We are inclined to believe that the recent change of Governors in this great State would not have been effected but for the solid vote of the medical profession.

A study of political economy is in no way antagonistic to that of pathology and therapeutics.

Examinations for the Medical Department of the U. S. Army.—We learn from reliable authority that the statement that has appeared in several recent papers and journals, including this, in regard to the examinations in October last in New York City, was incorrect. Twenty-two was the number who received invitations, but eighteen only presented themselves. This number was reduced to fifteen by failures to reach the physical standard, so that but fifteen were actually examined professionally. The number of successful candidates, four, was correctly reported.

The Cincinnati College of Medicine and Surgery.—Dr. J. Trush has resigned the Chair of Theory and Practice of Medicine in consequence of ill health and the vacancy thus created has been filled by the transfer of Dr. E. W. Mitchell from the Chair of Materia Medica and Therapeutics. Dr. G. A. Fackler, Professor of Materia Medica and Therapeutics at the Woman's Medical College of Cincinnati, has accepted the appointment to the vacancy created by the transfer of Dr. Mitchell.

The Southern Medical College Association versus the American Medical College Association.—There have been several medical college associations, all having exerted more or less influence for good upon the medical education of the United States. Last year after due consultation, a new American Medical College Association held its first regular meeting in Detroit. The feature most noticeable concerning this was that its membership included but one Southern medical school, viz., the Hospital College of Medicine of Louisville, Ky. The Northern medical colleges were mostly represented. The minimum standard of a medical college was laid down. Most intelligent physicians unite in affirming that this standard was not higher than necessary for the proper training of medical men of the present time. Still the Southern medical colleges, with the exception mentioned, kept aloof. The object at this is now apparent.

At the late meeting of the Southern Surgical and Gynecological Association, the Southern medical colleges formed a Southern Medical College Association, upon a plane distinctly lower than that of the American Medical College Association. The members of this Association would not join the older one, because its requirements were too high. Elsewhere we publish the full text of its rules and regulations. Doubtless some good may be accomplished by this movement, but we fail to see in what direction it is to be sought. It advertises Southern medical schools as low-grade institutions, unable or unwilling to furnish medical students the means for acquiring a first-class medical training. It may be that financial prosperity will follow such a course, but we fail to see that professional advancement lies along this route. Certainly the best grade of Southern medical students will be repelled by it, and desert Southern low-grade medical schools for the halls of such institutions as dare to support their convictions respecting medical training by their practical requirements.

It was a short-sighted policy that inaugurated this movement. The South, as much as the North, needs the best medical training for its medical students; and it must be a matter of regret that by this new organization the Southern medical schools have said to their brightest minds; "If you want the best medical training, you must go to the Hospital College of Medicine at Louisville or to some one of the Northern medical colleges, for the Southern medical schools have agreed to arrange their system of teaching to meet the needs of an inferior demand."

It is a matter of regret to every lover of medical progress that these Southern schools had not ranked themselves with the best in the land, and joined with them in advancing the requirements for the degree of Doctor of Medicine. We still hope that on second thought they will change their minds and join the foremost procession.—*American Lancet.*

Dr. Ralph Butterfield, of Kansas City, a graduate of Dartmouth College in 1839, has bequeathed $180,000 to the College for the purpose of founding a professorship in archeology and kindred subjects and for the erection of a suitable building. The donor acquired his property in business and not by the practice of medicine, and was supposed to be poor and needy until his death.

DOMESTIC CORRESPONDENCE.

Revision of the Code.

To the Editor of the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION:

Sir:—The reply of "A Conservative Member" to my inquiry as to his opinion of the editorial in the *Medical News* of September 17, on revision of the "Code," is very instructive. It was to be expected that an original member of the Association would dwell with affectionate sympathy upon the origin of the Code, and the high character of its model—the famous letter of Dr. Percival. To many of the younger members this information will prove very useful, and I am sure that the sage reflections of your correspondent will greatly instruct and benefit all of your readers. It is undoubtedly true that the "Code" is the expression of the most exalted moral sentiments found in any literature, if we except the Holy Scriptures But the question at issue is not as to the matter of the "Code," but as to the form and method employed in giving expression to the precepts which it inculcates. The editorial in the *Medical News* referred to contains a series of "tentative" propositions designed to suggest to the revisers of the "Code" the direction in which they could advantageously improve its construction. My purpose was to elicit from so able a defender of the "Code" a criticism of those "tentative" suggestions, for they seem to me very reasonable. If I do not intrude too much upon your space, I would still call the attention of "Conservative Member" to this portion of the editorial in question.

INQUIRER.

NECROLOGY.

Dr. George W. Sargent.

January 1, 1893, Dr. George W. Sargent, one of the best beloved of the physicians of Lawrence, Mass., died, aged fifty-eight years, having been born in Concord, Vt. on the 9th of April, 1834. He was the son of Dr. Seneca and Mary Wilder Sargent, his own full name being George Wilder Sargent. Soon after the birth of George, his parents moved to Pittsfield, N. H., and when he was about twelve, they moved to Lawrence, where he has resided almost continuously ever since. George graduated from the Lawrence High school and then went into the office of his father to study medicine and surgery. He graduated from the Albany Medical College in 1857 and received an appointment as physician and surgeon on a New York vessel, the New World, which ran between New York and England. He made two voyages on this vessel and then located in Lawrence. During the war he was a surgeon in the sixth regiment. On the death of his father, he succeeded to his practice. For over thirty years he had been an attending physician and surgeon at the jail; he had been one of the corps of consulting physicians at the general hospital since its foundation and was also treasurer of the United States Pension Examining Board. The only public office he ever held was that of city physician, which position he occupied for several years.

He was a member of Tuscon Lodge of Masons, of Monadnock Lodge of Odd Fellows, of Needham Post, G. A. R., of the American Medical Association, the Massachusetts Medical Society, the Essex County and Lawrence Medical clubs and the Monday night club.

He leaves a wife and two children. George B. is now at the Harvard Medical school, and Irving W. is at Phillips Academy, Andover.

Dr. B. A. Watson.

This well known and justly distinguished physician died at his home in Jersey City, December 22, aged fifty-six years. Dr. Watson was a surgeon of prominence in the army during the war. Since then he has attained distinction in the profession by his medical works. Dr. Watson had not long ago made a valuable series of observations on concussion of the spine. He also contributed to the subject of hydrophobia.

MISCELLANY.

OFFICIAL LIST OF CHANGES in the Stations and Duties of Officers Serving in the Medical Department, U. S. Army, from January 7, 1893, to January 13, 1893.

Major Robert M. O'Reilly, Surgeon U. S. A., the order directing him to proceed to Washington, D. C., and report for duty as attending surgeon, is suspended until further orders.

Lieut.-Col. Chas. R. Greenleaf, Deputy Surgeon-General U. S. A., is detailed as a delegate to the Eleventh International Medical Congress, to convene at Rome, Italy, on September 24, 1893, and will at the proper time proceed to the place designated. While abroad in pursuance of this order he will visit such points in Great Britain, France, Germany, Russia, Austria, Italy and elsewhere, as may be deemed necessary by the Surgeon-General of the Army, on official business, and on completion of the duty contemplated will return to his station, Washington, D. C.

First Lieut. J. D. Glennan, Asst. Surgeon U. S. A., having reparted at Hdqrs. Dept. of Texas, will proceed to Carrizo, Tex., and report to the commanding officer of the Seventh Cavalry squadron at that place for duty.

Capt. J. L. Powell, Asst. Surgeon U. S. A., is hereby granted leave of absence for one month, with permission to apply for an extension of one month..

First Lieut. B. L. Ten Eyck, Asst. Surgeon U. S. A., having reported for duty at Hdqrs. Dept. Texas, will proceed to Laredo, Tex., for service in the field, to relieve Capt. W. B. Davis, Asst. Surgeon, who upon being thus relieved will retnrn to his station (Ft. Sam Houston, Tex.).

First Lieut. Frank R. Keefer, Asst. Surgeon U. S. A., is relieved from duty at Ft. Riley, Kan., and will report in person to the commanding officer, Ft. Stanton, N. M., for duty at that post, relieving Capt. John M. Banister, Asst. Surgeon. Capt. Banister, upon being relieved by First Lieut. Keefer, will report in person to the commanding officer, Ft. Leavenworth, Kan., for duty at that post.

OFFICIAL LIST OF CHANGES of Stations and Duties of Medical Officers of the U. S. Marine-Hospital Service, for the four weeks ended January 7, 1893.

Surgeon George Purviance, detailed as chairman of board for physical examination of P. A. Surgeon S. C. Devan. December 21, 1892.

Surgeon J. M. Gassaway, to proceed to Gulf Quarantine on special duty, January 4, 1893.

P. A. Surgeon S. C. Devan, to report for physical examination, December 21, 1892. Detailed for special duty at Philadelphia, Pa.. December 28, 1892. Granted leave of absence for two months on surgeon's certificate of disability, January 7, 1893.

P. A. Surgeon P. C. Kalloch, to assume command of the Service at Cincinnati, O., when relieved at Boston, Mass., December 21, 1892.

P. A. Surgeon A. H. Glennan, leave of absence extended sixteen days on account of sickness, December 13, 1892. To proceed to New York City for special temporary duty, January 3, 1893.

P. A. Surgeon L. L. Williams, to proceed to Helena, Ark., on special duty, January 3, 1893.

P. A. Surgeon W. P. McIntosh, when relieved, to proceed to Boston, Mass., for duty. December 21, 1892.

P. A. Surgeon G. A. Magruder, when relieved, to proceed to San Diego, Cal., on special duty, thence to New Orleans, La., for duty. December 16, 1892.

P. A. Surgeon J. O. Cobb, upon expiration of leave of absence, to proceed to Port Townsend, Wash., for duty. December 21, 1892.

Asst. Surgeon W. G. Stimpson, to proceed to Detroit, Mich., for duty. December 20, 1892.

Asst. Surgeon B. W. Brown, to proceed to Port Townsend, Wash., for temporary duty. December 16, 1892.